Foundation Plant Services

FPS GRAPE PROGRAM NEWSLETTER

OCTOBER 2004 UCDAVIS

2004-05 New Releases and Selection Advances

FOUNDATION PLANT SERVICES WILL BE OFFERING dormant hardwood cuttings for over 600 grape fruiting selections (wine, table, raisin, juice and canning) and almost 100 grape rootstock selections for the 2004-05 dormant season. The updated list of registered selections and ordering information are available from the FPS office or may be accessed on the Web at: *http://fps.ucdavis.edu*. Dormant cuttings in short supply will be allocated among those whose orders are confirmed by November 15, 2004.

At this writing, 39 grape selections were advanced from Provisional to Registered California Foundation Stock status in the fall of 2004. Selections newly advanced to Registered status in 2004 are underlined in the list of *Registered Grape Selections for the 2004-05 Dormant Season*.

Ten new selections listed below were planted in the foundation block for the first time in 2004, and can now be ordered as Provisional status mist-propagated plants. Plants will be propagated after orders are received and supplied in about six to nine months. Disease testing for these selections was completed in spring 2004. After the vines in the foundation vineyard set fruit (in about 2 years), visual inspections will be conducted to check for variety correctness. Vines that are professionally identified will be advanced to California Foundation Stock status. All new Provisional status selections available from FPS are shown on the *New Materials Available from FPS in the 2004-2005 Season* list. This information is also available from the FPS office and on our Web site.

Alvarinho FPS 01 was imported in 2000 from the Agro Ideia Nursery in Portugal. This selection was made in the Porto Franco Vineyard which supplies grapes to the Cortegana Winery. Alvarinho is a white wine variety with thick skin that is reported to help

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Our customer service team looks forward to providing you with the information and assistance needed to obtain plant materials and services from FPS. From left to right are: administrative assistant/receptionist Sue Kinser, business office/distribution manager Cheryl Covert, and order processor Ginnie Dixon. You can reach them by phone at (530) 752-3590 or by email at *fps@ucdavis.edu*.

INSIDE:

FPS Grape Program Manager Susan Nelson-Kluk (left) and ARS horticulturist David Ramming compare notes and examine some of his new grape breeding selections currently undergoing testing at FPS. 'Sweet Scarlet' and 'Thomcord' [not shown], two of his seedless table grape varieties recently released by the USDA-ARS, are described on page 4.

Upcoming Meetings

2004 FPS Annual Meeting will be held October 27, 2004 at the Buehler Alumni Center, UC Davis. For reservations or information, contact the FPS office by phone: (530) 752-3590 or email: *fps@ucdavis.edu*

NAPPO Annual Meeting is scheduled for October 18–22, 2004 in Vancouver, British Columbia, Canada. Contact Mrs. Monique DeRepentigny, NAPPO 2004 Coordinator, at *mderepent@inspection.gc.ca*

2005 Unified Wine and Grape Symposium to be held January 25–27, 2005 at the Sacramento Convention Center, Sacramento, California. Information is available at *http://www.unifiedsymposium.org*

Variety Focus: Pinot Noir University Extension class April 7, 2005 in Freeborn Hall, UC Davis. Viticultural aspects, origins, clonal selection and performance, terroir. Guest speakers and wine tasting. Information will be available at *http://universityextension.ucdavis.edu*

56th Annual Meeting of the American Society for Enology and Viticulture (ASEV) to be held June 20–24, 2005 at the Washington State Convention & Trade Center, Seattle, Washington. Details are available at: *http://asev.org*

International Cool Climate Symposium on Viticulture and Oenology to be held February 6–10, 2006 in Christchurch, New Zealand. The theme for ICCS 2006 is "Winegrowing for the Future." For further information, visit the Web site at *http://www.iccs2006.org.nz*

Foundation Plant Services

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Foundation Plant Services
University of California
One Shields Avenue
Davis, California 95616-8600 U.S.A
Phone: (530) 752-3590
Fax: (530) 752-2132
Email: *fps@ucdavis.edu*
Web: *http://fps.ucdavis.edu*

Director: Dr. Deborah Golino

FPS Plant Pathologist: Dr. Adib Rowhani

Editor: Susan Nelson-Kluk
FPS Grape Program Manager

Editorial Assistance: Cheryl Covert

Newsletter Design and Photography: Bev Ferguson

Triplett blanc

by Peter Christensen, Viticulture Specialist, Emeritus, UC Davis

'Triplett blanc' will be the first public release of wine varieties bred and developed by Mr. Fay Triplett. Mr. Triplett was a wine grape grower from Ceres, California who was active in grapevine breeding for about 50 years until his death in 2000 at age 96. His breeding program involved crosses of little known as well as major wine varieties from throughout the world, and varieties from other breeding programs. Through the years, Mr. Triplett cooperated with UC Davis Department of Viticulture and Enology, UC Cooperative Extension -- Stanislaus County, Allied Grape Growers and E&J Gallo Winery for input on vine performance and wine evaluation of his more promising seedling selections. He kept meticulous breeding and vine performance records.

Photo courtesy of Peter Christensen

In the mid-1980s it was agreed to transfer 40 of the more promising selections to the UC Kearney Agricultural Research and Extension Center. This would provide an opportunity to compare and evaluate them in expanded plots in a research setting. It would also enable access for industry observation. The American Vineyard Foundation generously contributed some financial support for the Kearney trials; Mr. Triplett continued to provide his input during visits to the trial block. Ultimately, it was Mr. Triplett's wish to share any released selections with the wine industry. 'Triplett blanc' is being released as a public variety by Foundation Plant Services, where it has undergone indexing for freedom from virus.

'Triplett blanc' is a cross between Colombard and Vernaccia Sarda. Vernaccia Sarda was evaluated by A. J. Winkler and M. A. Amerine in the 1930s and 1940s. They described the variety as a vigorous grower and heavy producer with large, long-conical, shouldered, well-filled to compact clusters, maturing in late mid-season. It produced neutral white dry wines of mildly distinct, fruity and full-bodied character in region IV. It was considered to be less well adapted to region V, although some fair table wines were produced due to its moderately well balanced fruit composition.

Colombard is well known for its adaptability to warmer regions, producing good yields of well-balanced fruit composition due to its high acidity. It has excellent versatility for the production of varietal and generic wines and for concentrate, brandy and blending wine.

Vine and fruit characteristics of both Vernaccia Sarda and Colombard can be readily noted in 'Triplett blanc.' The vine is very vigorous, with strong, upright shoots. The canopy is not dense, as it is not prone to strong lateral shoot development. Clusters are large (average 1 lb.), long-conical, shouldered and well-filled. Berries are yellow-green with grayish bloom, medium size (average 2.3 g) and round. Vine yield over 7 years averaged 21.5 tons per acre, which included 3rd and 4th leaf. At full production, 5th to 9th leaf, the yield averaged 26.8 tons per acre. Vineyard design was 8'x12' vine and row spacing, bilateral cordon training at 54" with a single foliar catch wire and standard spur pruning.

Harvest date averaged September 25 with a fruit composition of 20.3° Brix, 0.87 g/100ml titratable acidity and pH 3.42. The number of clusters showing some decay averaged 6 out of 94 total per vine. This is a measure of those clusters with 4 or more adjoining berries showing decay. Typically, it indicates clusters with some partial decay rather than complete decay. Susceptibility to bunch rot appears to decline as the vines become more mature. Clusters showing decay only averaged two per vine during the last four years of data collection.

The release of 'Triplett blanc' was prompted by its unusually high productivity with good viticultural characteristics and fruit composition. Winery interest in the variety has focused on a white wine blending base and concentrate. Its ultimate fit into winery use will be determined with time.

There are at least 10 more white- and black-fruited Triplett varieties that are advancing to winemaking status and final evaluation for possible release. Their differing characteristics include earlier ripening, muscat flavor, very high titratable acidity for a warm climate, very low bunch rot potential, and high color and phenolic content. If released, they will also become public varieties.

We wish to thank Fay Triplett, his wife Maxine, and their family for their dedication and support that enabled this generous contribution to the grape grower community and wine industry.

Sweet Scarlet and Thomcord — Two New Table Grape Varieties Released from ARS

TWO NEW TABLE GRAPE VARIETIES have recently been released by the U.S. Department of Agriculture's chief scientific research agency, Agricultural Research Service (ARS). Sweet Scarlet (released 6/4/04) and Thomcord (released 9/11/03) were both developed by ARS horticulturist David W. Ramming and technician Ronald E. Tarailo at the Postharvest Quality and Genetics Research Unit, located in central California at the ARS San Joaquin Valley Agricultural Sciences Center in Parlier. These varieties join a series of top-quality red, white and black seedless grapes developed by this expert team.

Sweet Scarlet is a sweet, colorful red seedless grape with crisp flesh and a light, pleasant, muscat flavor. It ripens with Ruby Seedless, about the fourth week in August, in Fresno, California. The clusters are large in size (3.7 pounds) and length. The fruit retained its firmness and muscat flavor during two months of storage.

Embryo rescue was used to create Sweet Scarlet from a cross of two ARS-developed parent seedless grapes (C33-30 X C103-41). C33-30 and C103-41 are complex hybrids whose parents include Blackrose, Maraville, Tafafihi Ahmur, Divizich Early, Fresno Seedless, Italia, Calmeria, Muscat of Alexandria, Agadia, Muscat Hamburg. Perlette, Flame Seedless, Autumn Seedless and Sultanina. Sweet Scarlet has been tested in the San Joaquin Valley of California.

The California Table Grape Commission in Fresno, California, is the exclusive licensee for Sweet Scarlet, handling its distribution to nurseries. Two Sweet Scarlet vines were planted in the foundation block at FPS in 2000. After these vines are professionally identified for variety correctness, they will be assigned California Foundation Stock status. Sweet Scarlet propagation material from the FPS foundation block is only distributed to nurseries sub-licensed by the California Table Grape Commission.

Clusters of Sweet Scarlet, above, and Thomcord, below, on the vines at Foundation Plant Services.

Thomcord is a Concord-flavored blue-black seedless table grape that ripens mid-season. It is the result of the cross Thompson seedless X Concord made in 1983. Embryo rescue procedures were used to make the plants from Thompson seedless. The clusters average ¾ pounds, are conical in shape with a small wing, and medium to slightly loose in tightness. The fruit has a pleasing Concord flavor although not as strong as Concord. The skin is of medium thickness, not as tough as Concord and adheres to the flesh.

This variety is tolerant but not resistant to powdery mildew. It is productive and has produced 13-16 kg. per vine on bilateral-trained, spur-pruned vines. The fruit has been well received in farmers markets and could compete with Concord and Niabell in eastern states.

Thomcord is a public variety that may be distributed and propagated without restriction. Several mother vines with California Foundation Stock status are planted in the foundation block at FPS. FPS is now accepting orders for Thomcord mist-propagated plants and limited quantities of dormant wood.

New York Varieties Added to FPS Collection

FOUNDATION PLANT SERVICES HAS BEEN working in cooperation with Bruce Reisch of Cornell University to qualify some grape varieties developed at the New York State Agricultural Experiment Station (NYSAES) for the California Grapevine Registration and Certification (R&C) Program. The five varieties described below have passed all the disease tests prescribed by the R&C Program and are currently available from FPS as California Provisional Foundation Stock. This year, DNA analysis will be used to check the identity of the mother vines, so we expect to be able to advance all these varieties to Foundation Stock status in the near future.

Generally, these varieties are hybrids of native American species with *V. vinifera*. They are adapted to cool climate growing regions and may be suitable for use in the Northeast, Midwest and Mid-Atlantic growing regions of the United States. In addition to the five varieties listed here, FPS has been testing a collection of 11 numbered selections from the Cornell wine and table grape breeding program. These will also be made available in the near future to those signing Cooperative Testing Agreements with either Dr. Reisch or Cornell Research Foundation.

FPS will begin taking orders from the public for mist-propagated plants of Cayuga White and Traminette in fall 2004. The patented varieties (Chardonel, Marquis, and Melody) will only be distributed to licensees. To inquire about obtaining license agreements for these varieties contact Ms. Danielle Silva, Cornell Research Foundation, by email at: *des33@cornell.edu*, or phone at 607-257-1081.

Cayuga White is a white wine variety that was named by the NYSAES in 1972. It is the result of the cross Seyval X Schuyler and is one of the most productive and disease resistant varieties grown in New York. Its wine has been highly rated, having medium body and good balance. An important positive attribute is its versatility; it lends itself to making semi-sweet wines emphasizing the fruity aromas, and is also made as a dry, less fruity wine with oak aging. When harvested early, it may produce a very attractive sparkling wine with good acidity, good structure, and pleasant aromas. When over ripe, however, it can develop strong hybrid aromas with slight American overtones. The excellent cultural characteristics and high wine quality indicate an important future for this variety. Cayuga White is in the public domain and so will be distributed to the public by FPS without restriction. More information is available at *http://www.nysaes.cornell.edu/hort/faculty/reisch/bulletin/wine/index2.html*.

Chardonel is a late-ripening white wine grape which can produce a high quality wine with varietal character. It was named by the NYSAES in 1990 due to superior performance in Michigan and Arkansas, and is now the number 2 grape grown in Missouri. Cold hardiness has been nearly as good as for Seyval in New York, but good locations with long growing seasons are required to fully ripen the fruit. This cross of Seyval X Chardonnay

produces an excellent wine when fully ripened, with fruit aromas characteristic of Chardonnay and Seyval. The potential for sparkling wine production appears to be good. This variety is controlled by plant patent #7860 in the USA. More information is available at *http://www.nysaes.cornell.edu/hort/faculty/reisch/bulletin/chardonel.html*.

Marquis is a white table grape that was named by the NYSAES in 1996. It is the result of the cross Athens (Labrusca hybrid) X Emerald Seedless. Clusters are very large, medium compact and attractive, with large, round, yellow-green berries (3.5 - 5.0 gm/berry). Texture is melting, and the taste is very flavorful. Ripe fruit holds well on the vine, with the flavors going from a mild fruity flavor when first ripe, to a stronger Labrusca flavor two weeks later. Giberrellic acid treatment is not recommended, but well-timed cluster thinning and cane girdling can increase berry size and improve cluster compactness. Vines are moderately hardy, medium in vigor and productive. Marquis is controlled by plant patent #11,012 in the USA. More information is available at *http://www.nysaes.cornell.edu/hort/faculty/reisch/bulletin/marquis.html*.

Melody is a patented white wine variety that was introduced by Cornell University in 1985. It is the result of the cross Seyval X GW5 (Pinot blanc X Ontario). The young wine is fruity with hints of apricot and floral aromas. Quality is among the better of the white hybrids. The vine is moderately disease resistant and very productive and vigorous. Selection of well-

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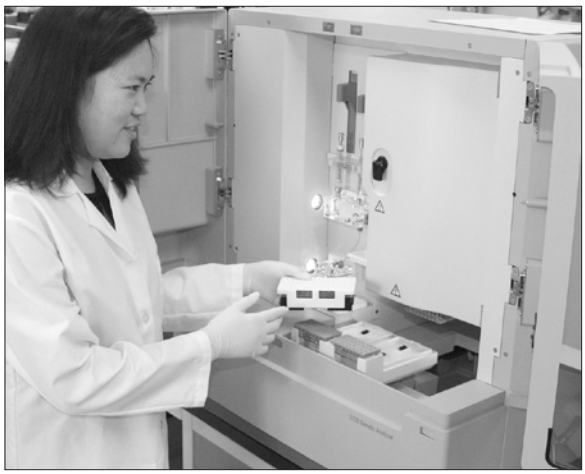
Updating Variety Names in the Foundation Block

By Susan Nelson-Kluk, FPS Grape Program Manager



FPS student assistant Elaine Lee places grape DNA samples in the Genetic Analyzer.

Jerry Dangl, manager of the FPS Plant Identification Laboratory, is continuing to test grape selections in the Foundation Vineyard to help resolve identification issues. This year he produced data that helped us assign more correct names to Nebbiolo and Riesling Italico selections.

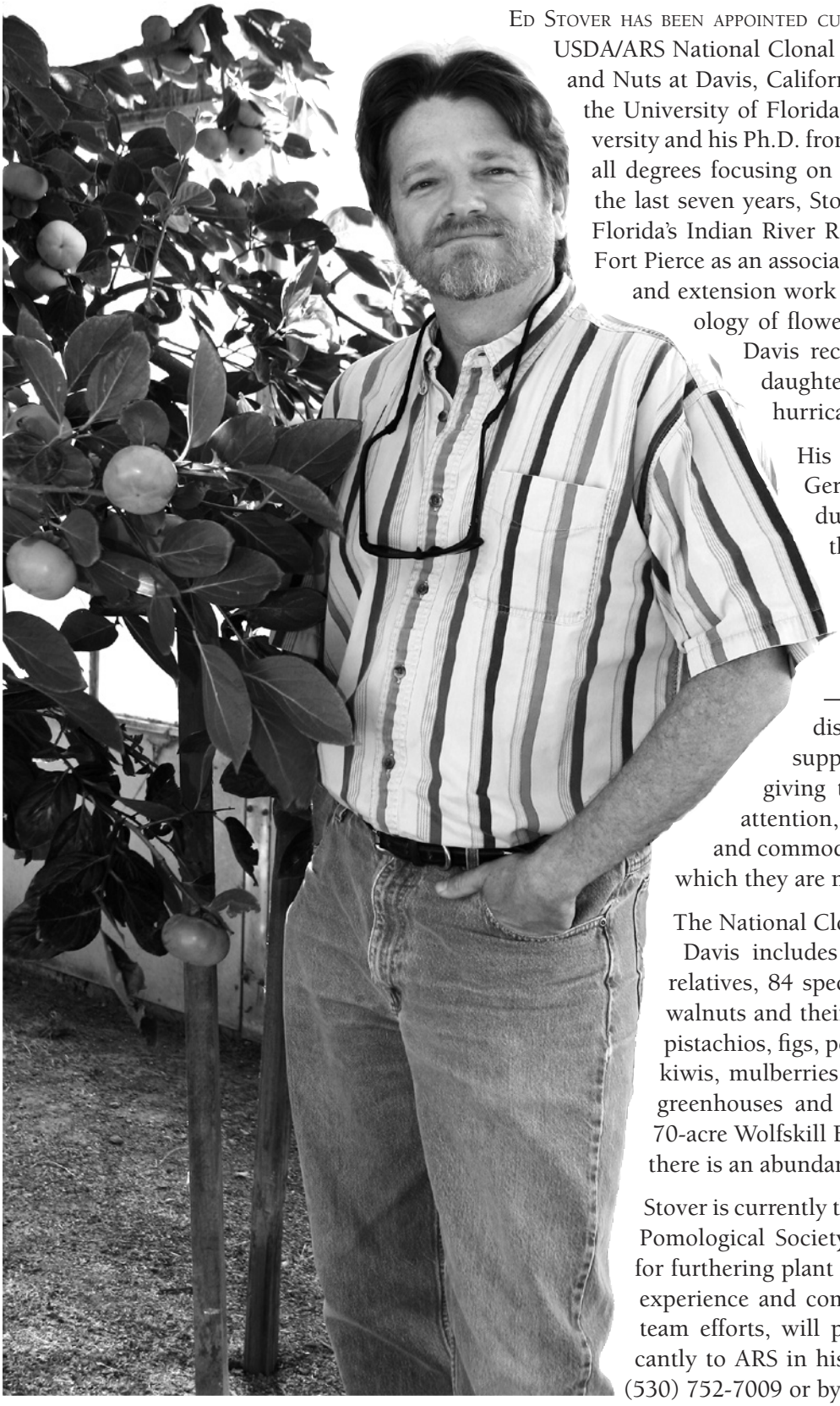
Four different names have been used to label Nebbiolo selections from seven different sources in the FPS collection. Up until now, we have used the same names our sources used to identify the various selections. Nebbiolo FPS 01 was collected from a UC Davis Viticulture and Enology Department vineyard sometime before 1970. Nebbiolo FPS 02, 03, and 07 (from CVT 036), Nebbiolo FPS 04 and 08 (from CVT 230) and Nebbiolo FPS 06 (from CVT 142) all came from Torino, Italy in 1993 labeled "Nebbiolo." Nebbiolo Fino FPS 02 was collected before 1965 by Dr. Austin Goheen, USDA, ARS Plant Pathologist, from a vine labeled "Nebbiolo Fino" in the UC Foothill Experiment Station near Jackson, California (Jackson Vineyard). Nebbiolo Lampia FPS 01 and Nebbiolo Michet S1 both came from the University of Torino, Italy in 1973 with those names.

DNA analysis showed that all the Nebbiolo, Nebbiolo Fino, Nebbiolo Lampia, and Nebbiolo Michet selections at FPS matched one another and several other Nebbiolo DNA references from Italy. "Nebbiolo" is the only Nebbiolo name included on the list of prime names approved by the Federal Alcohol and Tobacco Tax and Trade Bureau (TTB) for American wines. In order to simplify the naming of these selections, avoid confusion in wine labeling, and comply with the TTB the names Nebbiolo Fino, Nebbiolo Lampia, and Nebbiolo Michet have been changed to Nebbiolo. The original name will be retained in the public source records for each selection and can be considered a clone or clone type (group of clones) designation. The table below shows the old and new names and selection numbers for each selection.

The Riesling Italico materials at FPS came from two different sources. Originally both Riesling Italico FPS 02 and 03 came from clone ISV-CPF 100 which was imported from Conegliano, Italy in 1988. On the other hand, Riesling Italico FPS 04 came from the Jackson Vineyard where it was originally labeled "Walsh Riesling." The French ampelographer Jean-Michel Boursiquot noted in 2000 that Riesling Italico 02 is in fact 'Riesling' and not 'Riesling Italico'. DNA analysis comparing FPS 02, 03, and 04 shows that 02 and 03 match one another and are different from 04. FPS 02 and 03 were found to match the reference profile for 'Riesling', while Riesling Italico FPS 04 matches 'Riesling Italico' reference vines from three different international sources. The TTB lists 'Riesling' but not 'Riesling Italico' as an approved prime name. In this case, a petition to the TTB will be needed to gain approval for the name 'Riesling Italico'. Riesling Italico FPS 02 and 03 will be changed to Riesling FPS 18 and 19 (see table below).

Old Name	New Name	Reg Status
Nebbiolo Fino FPS 02	Nebbiolo FPS 09	Registered
Nebbiolo Lampia FPS 01	Nebbiolo FPS 10	Registered
Nebbiolo Michet FPS S1	Nebbiolo FPS S1	Non-registered
Riesling Italico FPS 02	Riesling FPS 18	Non-registered
Riesling Italico FPS 03	Riesling FPS 19	Registered

Ed Stover Selected as Curator of the USDA/ARS National Clonal Germplasm Repository at Davis



ED STOVER HAS BEEN APPOINTED CURATOR AND RESEARCH LEADER OF THE USDA/ARS National Clonal Germplasm Repository for Fruits and Nuts at Davis, California. Stover obtained his B.S. from the University of Florida, his M.S. from Texas A&M University and his Ph.D. from the University of Maryland with all degrees focusing on plant breeding and genetics. For the last seven years, Stover has been at the University of Florida's Indian River Research and Education Center in Fort Pierce as an associate professor, focusing his research and extension work on citrus fruit quality and physiology of flowering and cropping. He moved to Davis recently with wife, Kathy, and two daughters, leaving Florida just ahead of hurricane Frances.

His plans for the National Clonal Germplasm Repository include conducting research that will make the Repository more valuable to clients by identifying and categorizing useful traits in the extensive collection. The main parts of the Repository's mission —acquisition, maintenance and distribution—will remain strongly supported, but he looks forward to giving the characterization aspect more attention, and interacting with breeders and commodity groups to identify the traits in which they are most interested.

The National Clonal Germplasm Repository at Davis includes 54 species of grapes and their relatives, 84 species of stone fruits, 21 species of walnuts and their relatives, and lesser numbers of pistachios, figs, pomegranates, olives, persimmons, kiwis, mulberries and relatives, and loquats. With greenhouses and screenhouses in Davis, and the 70-acre Wolfskill Experimental Orchard in Winters, there is an abundance of material to work with.

Stover is currently the Vice-President of the American Pomological Society, and he hopes that his passion for furthering plant genetic resources, along with his experience and commitment to developing effective team efforts, will permit him to contribute significantly to ARS in his new role. He can be reached at (530) 752-7009 or by email at *ewstover@ucdavis.edu.*

Rootstock Selections with Strong and Broad Resistance to Nematodes are Nearing Release

by Andrew Walker, Howard Ferris and Liang Zheng
Department of Viticulture and Enology; Department of Nematology, University of California, Davis
awalker@ucdavis.edu

OVER THE PAST 10 YEARS, THE WALKER LAB HAS BEEN DEVELOPING GRAPE ROOTSTOCKS with the goal of broad and durable nematode resistance. The first step was to produce seedling populations with parents known, or suspected, to have very high nematode resistance. Previous testing had identified strong resistance in *Vitis candicans, V. champinii, V. cinerea, V. rufotomentosa* and *Muscadinia rotundifolia*, and in a series of hybrids of *V. champinii, V. riparia* and *V. rufotomentosa*. Many of these resistant species and hybrids root poorly; so they were crossed with *V. riparia* and *V. rupestris* to improve this character. About 5,000 seedlings were produced in 1993 and 1994, and those with the best overall vigor (about 1,000) were selected to undergo rooting tests. About 100 rooted well (at levels over 80%), and these plants were advanced to nematode screening.

At this point the Walker lab began collaborating with Howard Ferris and his technician Liang Zheng. These selections were tested against three strains of root-knot nematode (*Meloidogyne incognita* R3 and HarmC; *M. arenaria* HarmA), two of which, HarmA and C, were known to feed aggressively on Harmony and Freedom rootstocks. The selections were also tested against the dagger nematode, *Xiphinema index*. Fourteen selections were resistant to all four of these nematodes (Table 1), and rootstock trials in sites with severe nematode pressure were established with them in 2002 (Fresno – Fiesta Seedless; Wasco – Thompson Seedless; Santa Maria – Chardonnay).

These 14 selections were then challenged with a combined inoculation of root-knot nematodes R3, HarmA, HarmC and *X. index*, and with separate inoculations of citrus, lesion and ring nematodes. Selections 9363-16, 9365-43, 9365-85, 9407-14, 9449-23, 9449-25, and 9449-27 maintained their resistance under this combined pressure, and all except 9363-16 resisted citrus (*Tylenchulus semipenetrans*) and lesion (*Pratylenchus vulnus*) nematodes. None resisted ring (*Mesocriconema xenoplax*) nematode, although they fared better than the susceptible controls (Table 2).

Finally, the effect of increasing temperatures on HarmC resistance was examined (Table 3). Resistance to root-knot nematode is known to break down under high temperatures with tomato and several other species. High temperature impact on a deeply rooted perennial like grape is not likely to diminish the utility of a resistant rootstock, since most

Genotype	*X. index*	*M. incognita* R3	*M. arenaria* HarmA	*M. incognita* HarmC
8909-05	R	R	R	R
9317-06	R	R	R	R
9332-43	R	R	R	R
9344-03	R	R	R	R
9363-16	R	R	R	R
9365-43	R	R	R	R-
9365-62	R	R	R	R
9365-85	R-	R	R	R
9403-35	R	R	R-	R-
9403-107	R	R	R	R
9407-14	R	R	R	R
9449-23	R	R	R	R
9449-25	R	R	R	R
9449-27	R	R	R	R
Control Group:				
1616C	S	R	R-	R-
Harmony	S	R	S	S
Colombard	S	S	S	S

R = Resistant, no gall symptoms or egg masses observed
R- = Trace infection
S = Susceptible, symptoms present, nematode reproduction supported

Table 1. Genotypes with broad resistance to four nematodes when inoculated individually.

of the roots will not be subjected to high temperatures. However, resistance breakdown in the upper soil levels and encouragement of larger nematode populations there may help explain how more aggressive strains evolve. These temperature tests found that at 30°C resistance did begin to break down, but selections 9363-16, 9365-43, 94-7-14 and 9449-25 still produced relatively few eggs per plant.

Selection 8909-05 is also advancing through the screening process. It is a true *V. rupestris x M. rotundifolia* hybrid (one of a handful) which has excellent resistance to *X. index* and the three root-knot strains, but has not gone through combined nematode testing yet. It will be advanced to field trials to test its fanleaf tolerance with a number of other *M. rotundifolia* hybrids. Treatments to improve its rooting and grafting success will take place in the 2004-05 dormant season.

These eight selections are now undergoing an additional round of combined nematode testing and a final set of selections will be released to FPS in the winter of 2004-05 for virus testing and eventual qualification in the Registration and Certification Program. These rootstocks are designed to provide alternatives to Harmony and Freedom, with better nematode resistance, phylloxera resistance and a range of vigor-inducing abilities.

Genotype	Xi (combination)	RKN (combination)	Ts	Pv	Mx
9317-06	MS	S	R	R	HS
9332-43	S	S	R	R	S
9344-03	S	MS	S	S	S
9365-43	R	MS	R	R	S
9365-62	MS	S	R	R	S
9365-85	MS	MS	R	R	S
9363-16	R	R	S	R	S
9403-107	R	S	R	R	S
9449-23	MS	R	R	R	S
9449-25	MS	R	R	R	S
9449-27	MS	MS	R	R	S
9403-35	S	S		R	S
9407-14	R	R		R	
8909-05			R	R	
1616C	S	S	S	S	HS
St. George	S	S	S	R	S
Harmony		S	S	S	HS
Colombard		S	S	S	HS
Freedom			R	R	HS
G103	R	S	R	S	S
AC230	S	S	R	MS	HS

HS = Highly susceptible MS = 1 to 5 galls or egg masses
S = Susceptible R = Resistant

Table 2 (above). Summary of rootstock candidate resistance to *X. index* when in combination of root-knot nematodes (Xi combination), root-knot nematodes when in combination with *X. index* (RKN combination), and citrus (Ts = *Tylenchulus semipenetrans*), lesion (Pv = *Pratylenchus vulnus*) and ring nematode (Mx = *Mesocriconema xenoplax*) alone.

	Eggs per Plant at Varying Temperatures (°C)			
Genotype	22°	26°	30°	32°
Colombard	40	96	265	694
Harmony	7	52	629	613
1616C	3	35	184	
8909-05	0	0	1	5
9317-06	0	1	0	
9332-43	0	2	24	
9344-03	0	0	8	
9363-16	0	0	2	
9365-43	0	0	6	
9365-62	0	1	38	
9365-85	0	0	10	53
9403-107	0	3	66	77
9403-35	0	3	57	
9407-14	0	0	2	
9449-25	0	0	1	

Table 3 (right). The effect of soil temperature on resistance to *M. arenaria* HarmA.

The Origin of the Durell Syrah

by Rhonda Smith, Sonoma County, California Farm Advisor

DURELL SYRAH HAS BEEN A POPULAR SELECTION with grape growers and winemakers for over 20 years. In 2001 it was registered at FPS as Syrah FPS 08 (Durell clone, California), and it is currently available as Foundation Stock from FPS and as Certified Stock from Sunridge Nurseries (1). It appears that the source of this clone can be traced back to a single vine of Shiraz FPS 01 planted in an FPS Foundation Vineyard in 1973. This comes as no surprise to most growers who obtained budwood from the Durell Vineyard in the 1980s and beyond, but others may be interested in the story. This article is an acknowledgement of the popularity of the clone and documents its path from FPS and back again.

The Durell Vineyard Syrah

The Durell Ranch is in Sonoma County and includes Los Carneros and Sonoma Valley appellations. When Ed Durell bought the property in 1977 it was a cattle ranch. Steve Hill began to develop vineyards on the property in 1980. Today, Steve and his son Ned continue to manage Durell Vineyards at Sand Hill Ranch, now owned by the Price family.

In 1980, Steve field budded 6 acres of AXR#1 rootings planted in the Sonoma Valley AVA (American Viticultural Area) with budwood he obtained from Linda Vista Nursery in Napa. The paper trail of that purchase has long disappeared, as has the nursery itself; however, Steve recalls that the owner, Bill Guiremand, told him that the source of his Syrah was "Shiraz 1" from UC Davis.

Syrah grapes grown at the Durell Vineyard were sold to both Kendall-Jackson and Edmunds St. John Winery for several years, and Durell was a vineyard designate for two Syrah wines produced by these wineries starting in 1987 and 1990 respectively. In the late 1980s, growers began to purchase budsticks from the 6-acre block that was by then known as the "Durell Syrah." Vineyard manager Steve Hill always informed growers that the wood was reported to have been Shiraz 1 from UC Davis. Shortly thereafter, Steve sold budsticks each winter to Sonoma Grapevines Nursery in Santa Rosa. Sonoma Grapevines Nursery sold the scion wood and bench grafts produced from it as "Durell Syrah." Orders for the budwood stopped around 1993.

By the late 1980s the original 6-acre block of Durell Syrah was showing signs of decline, primarily due to Eutypa and phylloxera. At Durell Vineyard, Steve planted several small blocks of Syrah beginning in 1990 that totaled 6 or 7 acres and in 1994, 5 additional acres were planted at the adjacent Parmelee-Hill Vineyard owned and farmed by the Hill family. All of these acres were planted with dormant bench grafts propagated primarily by Sonoma Grapevines. The clones used were Shiraz 01 and occasionally the Durell Syrah. In 1997, budsticks were taken from the original 6-acre Durell Syrah block for the last time and used to field bud a 1.5 acre block of SO4 at Parmelee-Hill Vineyard.

In 1994, about 70 vineyard acres of the Durell Ranch were sold to Kendall-Jackson, including the original 6-acre block of Syrah. Steve Hill managed these acres for Kendall-Jackson until 1999 while he continued to manage the remaining Durell Vineyard that had not been sold. After the Kendall-Jackson purchase, both Edmund St. John Winery and Kendall-Jackson continued to source grapes from the 1980 planting of Syrah until the block was pulled after the 1999 harvest.

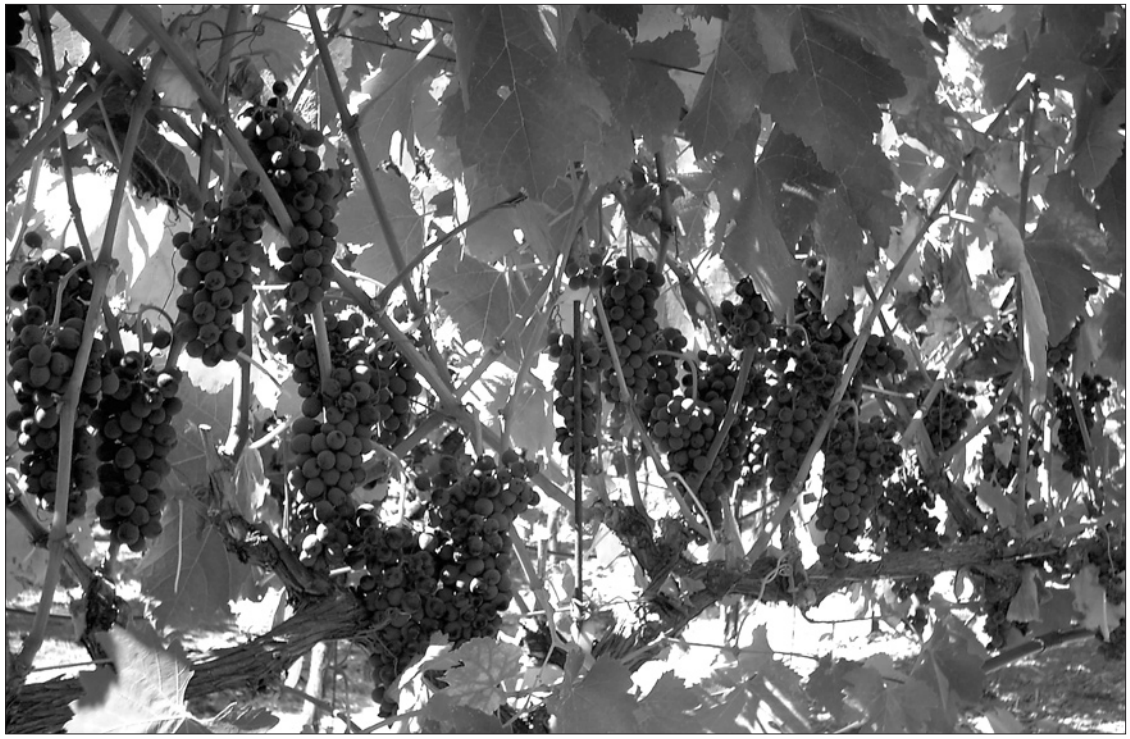
In 1998, Ed Durell sold the remaining acreage of his ranch, which included 115 acres of vineyard to William and Eleanor Price, who retained the name "Durell Vineyards." Today, Durell Vineyards at Sand Hill Ranch and the adjacent Parmelee-Hill Vineyard have about 13 and 16 acres of Syrah respectively. These blocks are planted on 5C, SO4, 3309C, 110R and Schwarzmann rootstocks.

The link to FPS

The first and only registered selections of Shiraz at FPS were available starting in 1976, and it was not until 1999 that the next selection was registered as Syrah. Syrah is a "prime" grape name approved by the Federal Alcohol and Tobacco Tax and Trade Bureau (TTB) and Shiraz is an approved synonym.

The first Shiraz selections at FPS were all from a single importation of Shiraz from Australia that arrived in 1970. The USDA plant inventory identifies the importation as Plant Introduction #364287 from Bests R3V34. According to Richard Hamilton, (Southcorp Wines, South Australia) the wood was probably taken from Best's Vineyard at Great Western, near Ararat in Victoria (2).

No detectable viruses were found in the imported vine; however, thermotherapy was used to create



The Durell clone Syrah growing at Steve Hill's Parmelee-Hill Vineyard in Sonoma Valley, California.

Photo courtesy of Steve Hill

seven selections (Shiraz FPS 01-07) from the original importation. Shiraz FPS 01 was planted in 1973 in the Foundation Vineyard, location FV L2 V4.

FPS and California Department of Food and Agriculture records indicate that Linda Vista Nursery purchased cuttings of registered Shiraz FPS 01 in 1977 and 1978. They were all propagated from FV L2 V4, the single Shiraz vine located in the Foundation Vineyard.

In the early 1990s, registration was discontinued for the old Foundation Vineyard at FPS including the original Shiraz FPS 01 vine (FV L2V4). Before registration was dropped, wood from the old vine was used to propagate two new registered Shiraz 01 mother vines grafted to Kober 5BB. In 1992, the new vines were planted in the currently registered Brooks North Foundation Vineyard at BKN B18 V7,8.

In 1998, Dr. Carole Meredith, a professor in the UC Davis Department of Viticulture and Enology, verified that all the Shiraz selections in the FPS collection have exactly the same DNA profile as the French Syrah. She concluded that Shiraz at FPS and Syrah are the same variety (3).

The return to FPS

In 1998, FPS obtained the Durell Syrah from a single vine located in a UC Cooperative Extension Mediterranean winegrape variety trial at the UC Hopland Research and Extension Center in Mendocino County. The trial had been planted in 1994 with bench grafts donated by Sonoma Grapevines and labeled as "Syrah, Durell Clone." FPS introduced this selection because numerous growers around the state had requested "Durell Syrah" and the connection to Shiraz FPS 01 had not been formally documented. The wood underwent testing at FPS and no viruses were found using current detection methods. As a result, it did not undergo virus elimination treatments. In the 2001/2002 dormant season, FPS released the registered selection Syrah FPS 08 as the Durell Syrah. It is very likely that Shiraz FPS 01 and Syrah FPS 08 are genetically identical. Vineyard performance of both selections should be the same.

Sources:

Steve Hill, General Manager Durell Vineyards at Sand Hill Ranch and co-owner Parmelee-Hill Vineyard, Sonoma, California; Susan Nelson-Kluk, Foundation Plant Services, UC Davis; Bill Ogden, Nursery Inspection Services, California Department of Food and Agriculture; and Frank Lopez, owner Wine Country Vines, St. Helena, California

References:

1. Foundation Plant Services, *Nursery Sources for California Certified Grape Material*, June 2004, University of California, Davis.
2. *FPMS Grape Program Newsletter*, No. 7, October 2001.
3. FPMS Grape Advisory Committee Minutes, Wednesday, November 3, 1999.

The Spanish National Grape Collection — La Finca El Encín

by Richard Hoenisch, Staff Research Associate, Department of Plant Pathology, UC Davis

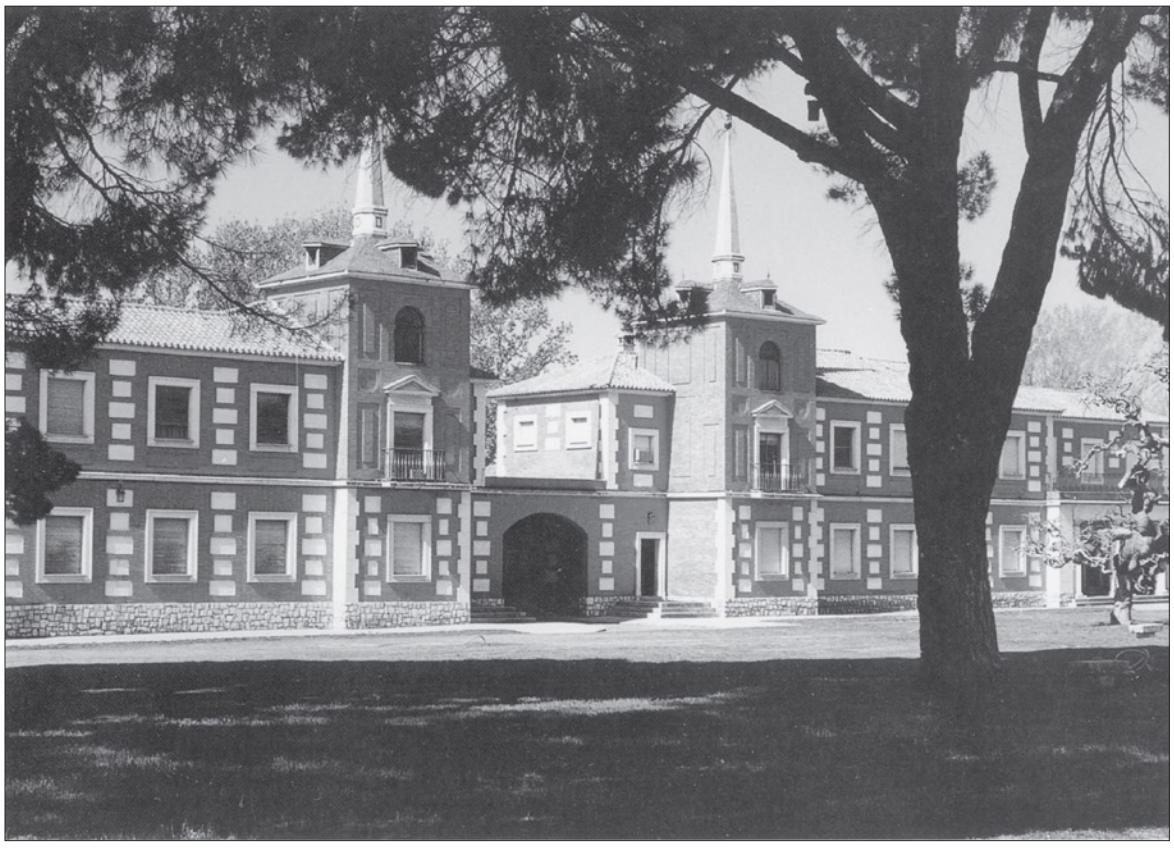
THE SPANISH NATIONAL GRAPE COLLECTION is located at El Encín, which is twenty miles east of Madrid at Alcalá de Henares. The El Encín viticulture and enology research facilities here are part of the very large complex of IMIA (*www.imianet.org*), "el Instituto Madrileño de Investigación Agraria y Alimentaria (IMIA)," or the Madrid Research Institute of Agriculture and Food. El Encín is its main research station. IMIA conducts research into many aspects of agriculture, food and food quality, horticulture, soil science, ecology, and forestry. The entire facility consists of 1,200 acres. The Spanish national department of Agriculture and Food (INIA) assists with the grape program within IMIA at El Encín.

The grapevine repository at El Encín consists of selections from all the regions of Spain, so it is indeed a national collection. It includes 2,726 accessions of rootstocks, hybrids, French hybrids, wine grapes, and table grapes. These are planted on 24 acres. Another 100 acres are used to evaluate varieties and clones. The entire facility is used for both research and education.

The El Encín property also includes an ecology habitat, with over 100 species of trees planted in a large forest, numerous bird and animal species, as well as model fruit and vegetable gardens for the young students' agricultural education.

The name "El Encín" comes from the name for a live oak tree (el encino). It is called "Finca El Encín," with "finca" meaning a farm or estate. It was originally a monastery, then a private estate. It was established as a national research facility in 1941. In 1954, the first collection of wine grape varieties for the Madrid area was established by INIA at El Encín. In 1984 the Spanish ampelography collections were assembled there into one national collection.

Luis Sanchez is the director of the entire operation of El Encín and Félix Cabello is the director of the ampelography collection. Cabello has reorganized the ampelography collection into a "Museum of Ampelography" (*http://www.imianet.org/rsc/evento/museo.pdf*).



The original estate house of "El Encín," at Alcalá de Hernares, Spain.

Photo ourtesy of El Encín.

This new collection is arranged for the education of the numerous visitors and scholars who visit El Encín. It is laid out according to use: rootstocks, table grapes, wine grapes, and according to the regions of Spain where they are grown. There is also a section for non-Spanish grape varieties.

Cabello also leads a group of Spanish grape researchers (Inmaculada Rodriguez, Alejandro Benito, and Jorge Diaz) who are using modern genetic analysis for variety identification (*http://www.redvidyvino.org*). Using polymerase chain reaction (PCR), they employ random amplified polymorphic DNA (RAPD), restriction fragment length polymorphism (RFLP), and microsatellites to genetically "fingerprint" each variety. Using these methods, they have developed genetic markers for over 1,500 grape varieties. The product of their work and their international collaborators can be found at *http://www.genres.de/vitis/vitis.htm*.

Winemaking is considered an essential part of the wine grape clonal selection and evaluation process at El Encín. Ten vines of each selection are planted on 110 Richter at 6' x 8' spacing so that the vines and wines can be evaluated for 25 years. Vines are evaluated for yield, pruning weight, vigor, and time of ripening. Micro-vinification is used to make wine in small barrels at El Encín winery, bottling and cellar facilties. The wine is evaluated for color, acidity, alcohol, and overall quality. The final selections are then sent to the INIA facility for virus testing in Murcia, then released to nurseries for propagation.

In addition to El Encín, there are a number of regional grape collections located throughout Spain. Their locations and dates of establishment are shown below.

- Valladolid for Castile and León (1992)
- Orense and Salcedo for Galicia (1988)
- Logroño for Rioja (1982)
- Zaragoza for Aragón (1990)
- Badajoz for Extremadura (1958)
- Valencia for the Levant region (1942)
- Ciudad Real for Castile-La Mancha (1987)
- Jerez de la Frontera for Andalusia (1940)

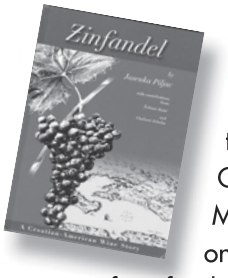
Editor's note: FPS is working with the scientists at El Encín to confirm the identity of our Spanish selections. We are also exploring the possibility of introducing new Spanish selections from El Encín or from the regional grape collections.

For Your Information…

UC IPM Pest Management Guidelines: Grape

UC Davis Agriculture and Natural Resources Publication 3448 is now available FREE online. The HTML guidelines include color photos, descriptions and control guidelines for insects and mites, diseases, nematodes and weeds in grapes. Visitors to the Web site can view the guidelines and print relevant pages for their use. There is also a free pdf version that can be downloaded, but does not contain photos. The $5.00 price shown is to purchase the printed guidelines — there is no cost to access the information over the internet. The Web address is *http://anrcatalog.ucdavis.edu.* From the home page, select: Browse Catalog; Pest & Disease Management; Pest Management Guidelines; Grape: UC IPM Pest Management Guidelines, and choose either to view the color HTML web pages, download the black and white pdf, or purchase a print copy.

Zinfandel: A Croatian-American Wine Story *by Jasenka Piljac*



The author, a native of Zagreb, studied at UC Davis and worked in the grape genetics laboratory of Dr. Carole Meredith. She accompanied Meredith, as translator and assistant, on a trip to Croatia to investigate the origins of Zinfandel. This book recounts the scientific process of tracking down the original Zin, adding her own knowledge of Croatia and its traditions. On her Web site, Piljac writes, "The aim of the book 'Zinfandel: A Croatian-American Wine Story' is to provide a picturesque and detailed portrayal of the search for original Zinfandel from an insider perspective. It is a detective tale and a travel log written for all Zinfandel lovers. It is also intended for all wine lovers and future visitors to Croatia…"

Additional information about the book and its author can be found at *http://www.crozinfandel.com,* where it can be ordered directly from Jasenka Piljac. The Wine Appreciation Guild also anticipates having copies available for sale by November 15, 2004. Orders can be placed by calling the Wine Appreciation Guild at (800) 231-9463 or online at *www.wineappreciation.com.*

Vine Mealybug Update: Grape Nurseries Taking Control

by David Haviland, Entomology Farm Advisor, UC Cooperative Extension, Kern Co.

DUE TO ITS RAPID SPREAD, vine mealybug has quickly become a serious pest of raisin, wine and table grapes in California. Compared to the long-resident grape, obscure and long-tailed mealybugs, vine mealybug produces more eggs, has more generations, and can evade pesticides and biological control organisms by overwintering underground on roots. Grape growers battling this pest report decreases in yields due to fouled fruit coupled with lower profit margins due to increases in pesticide use. Prior to 2002, there was only one localized infestation of vine mealybug recognized outside of Riverside, Kern and Fresno Counties. By the end of 2003, infestations had been documented in a total of 16 counties representing all grape-growing regions of the state.

For the past few years, UC researchers and grape nurserymen have been working feverishly to develop programs to stop the spread of vine mealybug. These efforts have come in response to indirect evidence that suggests that infested nursery stock has been a means of long-distance spread of this pest within the state. These claims have been made as new infestations, in previously uninfested regions, have been associated with planting stock purchased from nurseries located in infested regions between about 1999 and 2002. During this period there were no effective methods such as pheromone traps to monitor vine mealybugs in nursery operations.

Since 2002, several tools such as pheromone traps and hot-water treatments have become available to nurserymen to ensure the cleanliness of nursery stock. University of California researchers and regulators at the California Department of Food and Agriculture currently recommend that nurseries develop a personalized management program that is based on these procedures. No single part of this plan is foolproof, but integrated, they can provide a reliable blanket of protection against this pest. Management plans need to be in place regardless of whether or not the nursery is in a location near a confirmed infestation.

Sanitation

Of foremost importance to grape nurseries is to begin with clean nursery stock. Cuttings used for propagation should only come from locations that have been monitored for and deemed free of vine mealybug. If there is any doubt, throw it out. This also means that growers who wish to provide nurseries with buyer-furnished wood should be prepared to document that it is from a clean source. Nurseries cannot afford to import infested materials to their operations any more than a buyer would want to use infested nursery stock to plant a new vineyard.

Additional sanitation procedures for nurseries are similar to those for production vineyards. They include washing and controlling the movement of equipment, and keeping track of the movement of work crews. Greenhouse and field sanitation are also critical, and rootstocks and grafted plants should only be placed into greenhouses or fields that are free from this pest.

Monitoring with pheromone traps

Monitoring with pheromone traps is an integral part of any vine mealybug prevention program, and is now mandated by CDFA for all blocks listed through the state as Registered and Certified. Trapping programs such as these have an excellent track record, as nearly all new infestations of vine mealybug found in production vineyards since 2002 were detected with the use of pheromone traps. Current recommendations are to place a minimum of one pheromone trap per ten acres throughout any field that will be used for cuttings, or where rootings or dormant benchgrafts are being allowed to grow until the following dormant season. Traps should be checked monthly during the growing season, with lures changed every two months. Since males from other mealybug species will sometimes get caught in the traps, all suspected males from traps should be taken to the local Cooperative Extension or Agricultural Commissioner's office for confirmation.

Hot-water treatments

Hot-water treatments are a very effective means for removing vine mealybug from infested nursery stock. Laboratory studies show that over 99.9% of any stage

of vine mealybug can be killed on dormant grape cuttings and vines with hot-water treatments at 127°F. Three experiments to validate the effectiveness of hot-water treatments using commercial scale equipment at a Kern County nursery resulted in 99.8%, 100% and 100% mortality of vine mealybug for the three experiments respectively.

The hot-water treatment process currently involves three steps. First, vines are immersed for 5 minutes into a pre-heating tank at 30°C to warm up the wood. Next they are immersed for 5 minutes in the hot-water treatment tank at 52.8°C (127°F) to kill any stage of vine mealybug. Lastly, the vines are immersed for 5 minutes into a cooling tank around 23°C. The last of these tanks is used to cool down the wood to prevent any damage to its quality. Several literature sources document that these treatments can be done without sacrificing the quality of the treated wood. Hot-water treatments also have the added effect of providing partial to complete control of pests such as root knot nematodes and grape phylloxera, as well as diseases such as Pierce's disease (*Xylella fastidiosa*), *Phytopthora cinnamomi*, *Flavescence dorée*, and *Agrobacterium spp*.

Due to the effectivenss of these treatments, many California nurseries are using hot-water treatments in combination with sanitation and monitoring programs to ensure the cleanliness of nursery stock. Despite their effectiveness, however, hot-water treatments are not and should never be used as a substitute for destroying propagation materials known to be infested with this pest; nor should they be used as an alternative to monitoring and sanitation programs.

By utilizing a combination of sanitation, monitoring, and hot-water treatments, grape nurseries can effectively remove propagation materials as a vehicle for long-distance spread of vine mealybug. These efforts, coupled by efforts of grape growers to prevent localized spread of this pest are essential to maintain the vine mealybug-free status of most California vineyards.

Commercial hot-water treatment facility in Kern County. *Photo courtesy of David Haviland.*

New York varieties… *cont. from page 5*

exposed canes when pruning will ensure an adequate crop each year. No cluster thinning is required. Melody is in limited commercial production and acreage is increasing. The plant patent (#6159) for Melody is scheduled to expire on November 5, 2005. More information is available at: *http://www.nysaes.cornell.edu/hort/faculty/reisch/bulletin/wine/index2.html*.

Traminette is a late mid-season white wine grape released by the NYSAES in 1996. This Gewürztraminer hybrid (JS 23-416 X Gewürztraminer) produces wines of excellent quality similar in aroma to its well-known parent. There is good balance in the must between levels of sugar, acid, and pH. The vine is much more winter hardy than its Gewürztraminer parent, moderately productive, and just slightly susceptible to powdery mildew and Botrytis. Typically, the wines made with some skin contact have strong spice and floral aromas, a full structure, and long aftertaste. The wine can be made dry or sweet. Mouthfeel of the dry wine is good with nice texture and good spice feel. Maturity is late mid-season, Oct. 5-10 in Geneva. Traminette is a public variety that may be propagated without restriction in the USA, but it is controlled in foreign countries. More information is available at *http://www.nysaes.cornell.edu/hort/faculty/reisch/bulletin/traminette.html*.

Photos courtesy of Bruce Reisch.

Grape Crown Gall Biology and Strategies for Control

by Thomas J. Burr, Professor of Plant Pathology, New York State Agricultural Experiment Station, Cornell University

Crown gall is a disease of worldwide importance on grape that is caused by a bacterium, *Agrobacterium vitis*. Crown gall occurs on many different fruit and ornamental crops, but in those cases it is caused by *A. tumefaciens,* a related bacterium. *A. vitis*, which is only found on grape, most commonly causes the development of galls at graft unions or on lower trunks and to a lesser extent on canes (Figure 1). When young vines develop crown gall at their graft unions they often die, whereas older vines may show stress depending on the severity of the gall and will usually survive the infections. *A. vitis* lives internally in grapevines and can be isolated from bleeding sap; therefore it is frequently disseminated in apparently-healthy propagation material.

Galls are generally not observed on grape roots; however, the bacterium causes necrotic lesions on roots (Figure 2). Recently we also found that *A. vitis* can cause necrosis of the cambium in wounded woody canes, thereby preventing wound-healing and adversely affecting graft take. Further research to elucidate the potential negative effects of *A. vitis* at graft unions is underway.

Infection

The infection process of *Agrobacterium* represents the only known case of natural inter-kingdom transfer of DNA (bacterial DNA is transferred to and expressed in the plant). Thus crown gall infections can be considered a form of natural genetic engineering of plants. The infections are initiated at injury sites; on grapes,

Figure 1. Crown gall infection caused by *Agrobacterium vitis*. Infections are first visible in mid-July following injury that occurred during the winter from cold temperatures.

Photos courtesy of Thomas J. Burr

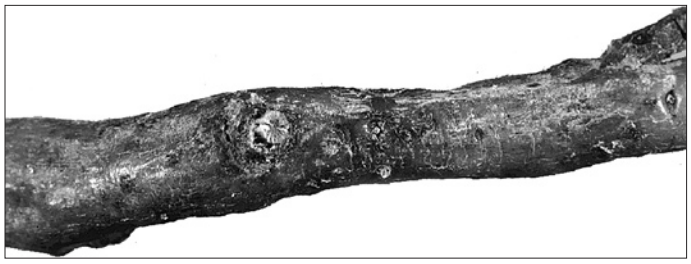


Figure 2. Localized necrosis of a grape root caused by *Agrobacterium vitis*. The bacterium causes necrosis of roots on all rootstock and scion cultivars that have been tested.

these are most commonly caused by freezing temperatures. Another common infection site is the graft union where that bacterium may cause galls, or completely prevent graft take, as mentioned above. Other types of wounds—such as those made from cultivation and during pruning—generally do not stimulate the development of crown gall. Wounds release chemicals (sugars and phenolics) that stimulate the crown gall infection process once they are detected by the bacterium. They cause the bacterium to migrate toward the wound where it attaches to the plant cells. The chemicals also trigger the expression of genes in *A. vitis* that are necessary for infection. Once *A. vitis* transfers a portion of its DNA (genes) to the plant, the genes encode enzymes that stimulate production of abnormal levels of plant hormones (auxin and cytokinin) that cause the plant cells to proliferate and form galls.

Wounding of plants probably plays another role by stimulating the development of plant cells, during wound healing, that are highly susceptible to infection by the pathogen. We are continuing research to identify specifically which cells in grape wounds become infected and the role of auxin in stimulating the development of the cells.

Pathogen variability

Strains of *A. vitis* are variable with regard to their genome, including the number and types of pathogenicity genes they carry. Strains collected from commercial vineyards and from wild *V. riparia* vines collected in New York State were grouped based on genetic profiles. It was discovered that all of the strains isolated from wild *V. riparia* were non-gall forming types and appear to represent a separate group of the bacterium.

Sources of inoculum

Thus far, *A. vitis* has not been detected on plants other than grape, or in soils collected from sources other than vineyards. Once introduced to soil, however, the bacterium was found to survive for at least a two-year period on infested grape root debris. Grape roots are known to persist in soils for long periods after vines have been removed, and it is likely that *A. vitis* will persist with them. Although survival on root debris comprises a source of inoculum for infection of new vines, we believe that the most common and important means of introducing the pathogen to a vineyard is by carrying it along with new vines.

Control practices

Strategies for management of crown gall include water management, maintaining multiple trunks in crown gall-conducive vineyards, considering scion and rootstock susceptibility, obtaining "clean" plants when possible, and selection of sites that are not prone to winter injury. As mentioned above, injuries from cold temperatures stimulate the development of crown gall. The practice of multiple-trunking will not eliminate the bacterium from vines; however, it often allows a grower to establish trunks that do not develop crown gall and from which a crop can be produced. Obviously, if injury occurs yearly on trunks, they will get repeated crown gall infections and will not produce a suitable yield. Where possible, managing vine vigor through water management also affects crown gall. Vines in wet sites that grow vigorously late in the season will typically be more prone to injury and subsequently crown gall.

Because the bacterium can survive internally in cuttings, methods have been developed to index them for *A. vitis*. A standard method that we use involves callusing cuttings and then assaying the callus tissue for the pathogen. If *A. vitis* is present, it will multiply to levels in the callus that allow its detection on a selective culture medium. Isolated colonies are then characterized with antibodies (ELISA) and with other methods such as PCR. Although the methods to identify the bacterium are very accurate, it is difficult to know the sensitivity of indexing methods; i.e., how many bacteria in a cutting can be detected? If *A. vitis* is not detected in a cutting, we cannot be entirely certain that it is free of the pathogen. Research is continuing to improve the sensitivity of indexing methods.

Attempts have been made to produce *A. vitis*-free grapevines. One approach was to submerge grape cuttings in water at 50º–52º C for 30 to 60 minutes. This treatment resulted in little or no bud injury if treatments were done in January and February, when they were fully dormant. Later treatments sometimes resulted in bud death or delayed bud growth. The treatments were shown to significantly reduce the levels of *A. vitis* in the cuttings, but even the higher temperature for 60 minutes did not eradicate all of the bacterium from the cuttings. Therefore, the procedures evaluated thus far are not recommended as means of eliminating *A. vitis* from cuttings.

It is possible to produce *A. vitis*-free vines by initiating the plants from shoot-tips in tissue culture. It was determined that *A. vitis* is not present in tips of grape shoots and therefore vines propagated from them are free of the bacterium. Subsequently, such vines have been established in mother blocks in sites that were not previously planted to grapes. Vines in the mother blocks are being indexed yearly to determine if they remain free of *A. vitis*. Thus far this approach has been successful in three different test cases for providing sources of propagation material that are free of the pathogen. In another mother block that was planted immediately adjacent to a crown gall-infected vineyard, the bacterium could be detected in the mother block vines within four years. Therefore the bacterium can move from vine to vine possibly in water or by roots from different plants that come in contact with each other.

continued on page 18

Crown gall… *cont. from page 17*

Scion and rootstock cultivars should also be considered in the management of crown gall, as they differ in their susceptibility. In general, all *Vitis vinifera* cultivars are highly susceptible as compared to *V. labrusca* and hybrids. However, especially within the hybrids, the range of susceptibility can be quite great. Rootstocks also differ greatly in their susceptibility to crown gall. Highly resistant are Couderc 3309 and Mgt 101-14, whereas more susceptible are Richter 110 and Teleki 5C. A general correlation can be made between the efficiency of rootstock callusing and their susceptibility to crown gall. As mentioned above, callus cells are highly conducive to infection and therefore these rootstocks are more susceptible to infection. Although scion and rootstock genotypes differ in susceptibility to crown gall, this does not necessarily mean that "resistant" cultivars are free of the bacterium. Previous studies indicated that resistant cultivars such as C3309 still harbor systemic populations of *A. vitis*. Complicating the determination of cultivar susceptibility to *A. vitis* is the fact that different cultivars respond variably to different diverse strains of the pathogen. Such considerations must be taken into account when evaluating germplasm for susceptibility to crown gall.

There are no effective chemical controls for crown gall. Although antibiotics and copper bactericides are able to kill the bacterium on contact, they do not penetrate the vine and come in contact with bacteria residing systemically. Painting of galls with anti-bacterial mixtures may kill bacteria in the gall (and in some cases gall tissues) but will not eliminate the bacterium from the vine.

Biological control of crown gall on fruit and ornamental plants has been very effective, and commercial preparations of a non-pathogenic *Agrobacterium* (K84) are sold in many regions of the world. Unfortunately, K84 is not effective against *A. vitis* on grape. However, it has been shown that when a non-pathogenic strain of *A. vitis*, F2/5, is applied to wounded grape tissue in advance of gall-forming pathogen, crown gall is prevented. The mechanism by which F2/5 prevents crown gall is unknown. Two interesting points are: that it only inhibits crown gall on grape, and that it must arrive at the wounded grape tissue before the pathogen.

Although F2/5 has been shown to be highly effective for controlling crown gall in greenhouse experiments, its effectiveness has not yet been proven in the field. Several experiments are underway and in these cases vines are soaked in suspensions of F2/5 prior to planting. The objective is to allow F2/5 to colonize wounds on the roots and crown and to ideally establish itself in the grapevine. Thus far, variable success in control of crown gall with F2/5 in the field has been noted.

The incidence of crown gall and its importance in vineyards throughout the U.S. appears to be on the increase. This trend seems to be occurring regardless of winter temperatures. Possible reasons may be related to new vineyards being established in many regions of the U.S. and the possibility that some sites are not environmentally suitable for growing certain cultivars or rootstocks. Other reasons for increased crown gall may have to do with vineyard (crop) management. Over-cropping can lead to vine stress and subsequent sensitivity to cold injury and thus crown gall. In California, the changing of rootstocks in recent years has influenced the number of samples expressing crown gall that have been sent to my laboratory. In almost every case, vines showing crown gall were grafted on highly-susceptible rootstocks.

Our work has been able to progress because of the continued support from the NY Wine and Grape Foundation, the Lake Erie Regional Grape Program, the NY Grape Production Research Fund, the USDA Viticultural Consortium East Program and various private sources.

Vine Selection and Clones

by Deborah A. Golino, Director, Foundation Plant Services and James A. Wolpert, Chairman, Department of Viticulture and Enology, University of California, Davis

During the 1930s and 1940s, it became clear that virus diseases were reducing the productivity and quality of some vineyards in California. In addition, many commercially available grapevine selections were mislabeled or incorrectly identified. By 1952, Harold Olmo led the formation of the California Grape Certification Association to develop, maintain, and distribute virus-tested and correctly identified grape stock. By 1958, this program combined with the UC Davis disease-tested fruit and nut tree program to become Foundation Plant Materials Service. Curtis J. Alley, a student of Dr. Olmo's who went on to become a faculty member in the UC Davis Viticulture and Enology Department, initially managed the collection. William Hewitt and Austin Goheen, UC Davis and USDA-ARS plant pathologists respectively, provided expertise in virus detection and elimination.

This program is now known as Foundation Plant Services (FPS). It is the home of the Foundation Vineyard, the source of grape varieties in the California Grapevine Registration and Certification (R&C) Program. The vines at FPS are "registered vines" with the California Department of Food and Agriculture. They must be maintained at certain standards of disease testing and inspection under state regulation. Wood from this Foundation Vineyard is sold to grapevine nurseries in the R&C program where it is also registered and maintained under a set of regulations. These blocks of grapevines can be used by nurseries to create "certified stock" sold to growers. This certification assures growers that vines have successfully completed extensive virus testing. The majority of California's grape planting stock originates from this program. FPS is also authorized to import new grape selections from around the world, which adds to the diversity of planting stock available to grape growers. In addition to importing clones, FPS also works to preserve clones growing in California's premier vineyards.

There are two critical areas that need to be considered in developing a superior grape variety collection. First is disease status. Until a new selection is free of virus, vine performance is impossible to evaluate because vigor, yield and fruit quality are all affected by grapevine viruses. By using certified grape nursery stock, growers can reduce uncertainty about vine performance. Secondly, as selections of the same variety from different sources are compared, subtle performance differences between selections of the same wine grape variety become apparent. These differences are caused by mutations in genes that control characters such as leaf lobing, berry color, disease resistance, and ripening date. Over time, mutations accumulate and lead to greater diversity in older varieties. Selections that differ in these ways and have been evaluated are known as "clones" of a variety. Planting superior clones can improve a variety's production and winemaking characteristics.

Today, with increasingly diverse plant materials available, growers planting new vineyards need to consider choice of clone as well as choice of variety. Most of the older FPS selections were collected by UC Davis scientists over the years both by selection from superior California vineyards and by plant exploration in other countries. New clones continue to originate from formal clonal selection programs and public research projects around the world. Some of the programs that have contributed significantly to clonal diversity in California are ENTAV (Etablissement National Technique pour l'Amélioration de la Viticulture, in France); Geisenheim (Geisenheim Research Institute, in Germany); and Rauscedo (Vivai Cooperativi Rauscedo, in Italy). Where appropriate, the clone numbers of these programs as well as the selection numbers used by FPS are provided in the individual variety sections of *Wine Grape Varieties in California*.

New clones of the major wine grape varieties are added to the FPS Foundation Vineyard frequently. Researchers, viticulturists and winemakers around the state work to ensure that valuable "heritage" field selections—those collected from premier vineyards with a reputation for quality wine—are available as certified selections. In some of California's oldest vineyards, these selections represent pre-1900 European introductions that may contribute greatly to varietal clonal diversity.

The same clone can be introduced more than once to FPS; each introduction receives a unique selection number to preserve its identity. In addition, sub-clones that have been produced by heat treatment or tissue

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culture virus-elimination therapy also receive unique numbers. This has led to a sometimes bewildering accumulation of selection and clone numbers for plant materials that may not differ significantly in performance. This is even further complicated by the existence of European clones that have reached California through other importation centers and may be named according to a number of different conventions.

An additional complication results from the intellectual property issues that have developed around wine grape clones. Some clones are trademarked and/or proprietary while others are in the public domain. For example, FPS has public or "generic" selections of many of the ENTAV clones in the Foundation Vineyard collection that are known as "Reported to be French" with an ENTAV-assigned clone number as well as an FPS selection number. More then one FPS selection may be available from the same French clone due to independent import and subcloning. These selections have no assurance of authenticity. However, clones that have come directly from ENTAV are part of a trademark program and are known as "ENTAV-INRA®." Not all of these trademarked ENTAV-INRA® clones are California certified; some have origins independent of the FPS program.

Today in California there is an unprecedented wealth of clonal material of the major grape varieties. Decisions on clones have become an integral part of the vineyard planning process. As in other wine regions, California growers want to know how clones might enhance viticultural performance and wine quality or help create a particular wine style. Along with this heightened interest in clones, several important points must be kept in mind:

Clone choice is only one of many important decisions when establishing a vineyard. Variety choice, site climate, soil type, vineyard design (spacing, trellising, and rootstock), and annual cultural practices (irrigation, canopy management, and crop load) will impact final wine quality far more profoundly than clonal choice. There is no such thing as a "perfect" clone that will overcome a grower's inappropriate site selection or poor management decisions.

There is no one "best" clone. A clone's suitability for a particular vineyard depends on the target wine market and desired wine style, as well as the site and vineyard conditions noted above. High-yielding clones are just as appropriate for low-cost wines as low-yielding clones are for high-value wines. When the retail bottle price for a variety can vary by more than 20-fold, there is clearly room for more than one clone. Thus, the term "best" is value laden and must be carefully defined by the producer's goals.

A clone selected in another country is not necessarily superior to what is available locally. Clones from regions known for fine wine, particularly Burgundy and Bordeaux, are highly sought after. However, the selection criteria must be explicitly understood

to ascertain whether clones selected abroad have value in California. Climates abroad can differ dramatically from California's. Some wine regions have strict yield limits, often made possible by the high bottle prices their wines command. Thus, "good" clones in those regions are those that perform well under specific environmental and economic conditions, neither of which may apply to California. Before making a significant investment in clones selected in another country, growers should verify the performance of those clones under their local conditions.

Virus infections can compromise even the best clones. Clones selected for high-quality wine and freedom from virus are the most desirable. Severe viruses are not tolerated in any of the world's clonal selection programs. Growers should be aware that, in addition to registered selections of clones, there is a great deal of common stock sold in California that has never been checked for virus. European clonal selections that have entered the United States illegally and field selections from old, established vineyards are frequently infected by virus. Growers should avoid virus-infected planting stock since many commonly used rootstocks are very sensitive to virus diseases.

Continued clonal evaluation of major varieties such as Cabernet Sauvignon, Chardonnay, and Zinfandel in California is supported by growers' and vintners' funding organizations. However, this progress is challenged by several complicating factors:

First, many varieties contribute significantly to the state's wine economy. In other countries, regions can concentrate on relatively few varieties of importance. Even for "niche" varieties with small acreage such as Malbec, Viognier, Sangiovese, or Tempranillo, clonal performance is a significant issue because a new variety will not be accepted if the principal clone in use performs poorly.

Secondly, fine wine production in California spans a wide variety of climatic regions, elevations, and soil types. For the major varieties—Chardonnay, Cabernet Sauvignon, Merlot, Zinfandel, Pinot noir—multiple trials are needed to understand how clones will perform in different regions. In addition, the flood of new clonal material in California brings a continuing need for new sets of trials.

Finally, clonal evaluation involves three consecutive steps: viticultural analysis (growth and yield components, rot susceptibility); wine analysis (chemical data, color, tannin); and sensory evaluation. Each step builds on the previous one, but with increasing resource needs. Evaluating the great diversity of clonal material now available in California will require expanding current viticultural research programs and winemaking evaluations.

Reprinted from Christensen, L. et al. 2003. *Wine Grape Varieties of California*. University of California Agriculture and Natural Resources Publication 3419. *Photo by Jack Kelly Clark.*

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. While living in Chico, she traveled to Iran three times to visit her husband, who worked there for Bell Helicopter. She also visited Turkey, Greece and Norway during her travels. After graduation, Donna moved to Fairfield and worked as a civilian for the U.S. Air Force at McLellan Air Force Base. In 1986, she moved to Woodland and later came to work for Foundation Plant Materials Service, now Foundation Plant Services (FPS), in 1989.

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. Donna was the person we turned to whenever we needed to find or fix or finish anything. In October, 1993, she retired when the University offered early retirement incentives that were too good to refuse. Very fortunately, we were able to recall her to work half-time in 1994.

Donna chose to work at FPS up to the month before she died, stating that she liked the people and what she was doing, and she made one last visit a few days before. She finished several important projects in her final months at work. Her notes are still everywhere, a constant reminder of the vigilant attention she gave us.

In addition to her university job, Donna worked as a volunteer for the Woodland Opera House, visited the Stollwood Convalescent Hospital each Friday with her dog, and refinished furniture. She was a member of the Woodland Presbyterian Church, Beta Sigma Phi sorority, and went line dancing every Wednesday night. She also traveled back to Portal, North Dakota each year to visit family.

Survivors include her daughter, Barbara Marzolf of Chico; sons, Bradley Marzolf of San Luis Obispo, and Curtis Marzolf of Woodland; brother, Erling and wife JoAnn Scheldrup of Portal, N.D.; sisters, Patricia Hill and husband Jim of Minneapolis, Minn., Marilyn Collier and husband Jay of Fairfield, and Carol Scheldrup of Sonoma; aunt, Ruth Groninger of Minot, N.D.; grandchildren, Joseph and Kylie Mendonca of Chico; and numerous nieces and nephews.

The family requests memorials be directed to Woodland Opera House Fund; or to Yolo Hospice, P.O. Box 1014, Davis, 95616, in her behalf.

Glenn Friebertshauser

Courtesy photo

Glenn Friebertshauser died peacefully in his Davis home on April 7, 2004, having lost his well-fought battle against cancer. He was 54 years old. He is survived by his wife, Kathy, to whom he was married for more than 33 years; his daughter Amy, 22, of Oakland; and his daughter Allison, 16, of Davis.

Born March 7, 1950, Glenn grew up in Southern California, graduating with a bachelor's degree in biological sciences from UC Irvine in 1971. After completing his master's degree in plant pathology at UC Davis, he started AgriAnalysis in 1981.

Most of us in the grape industry came to know Glenn through AgriAnalysis. In the beginning, he tested lettuce seed for lettuce mosaic virus as part of a seed certification program. He also consulted for tree fruit and vegetable growers as well as attorneys regarding plant disease issues. In the late 1980's AgriAnalysis' business began to focus on grapes. According to Glenn's wife, Kathy, "Glenn was drawn to grapes because he considered walking in a vineyard collecting samples to be a perfect day."

Over the past decade Glenn built AgriAnalysis into an important resource for the grape industry. He started by offering ELISA testing for grape virus diseases and expanded to isozyme analysis for grape rootstock identification, PCR testing for grape virus diseases, PCR testing for grape fungal pathogens as well as ELISA and PCR tests for *Xylella fastidiosa*, the bacterium that causes Pierce's disease. He also produced healthy grape plants in sterile tissue culture to facilitate their shipment into foreign countries.

"Glenn's goal was to provide affordable services to the agriculture community. He derived great joy from providing service– that was his compensation rather than making large profits," according to Kathy, his wife and business partner. "I considered selling the business after his death but the potential buyers didn't have Glenn's heart." Kathy recently retired from her position as a research scientist at UC Davis and, together with an experienced staff, continues to operate AgriAnalysis, offering a full range of services. For more information you can go to *www.agrianalysis.com* or phone 530-757-4656.

Glenn had recently started a new business, Safari Stones, in which he produced handcrafted jewelry and tumble-polished stones. His favorite athletic activities were fishing and bicycling, especially mountain biking down ski slopes in the summer.

Memorial donations may be made to the California State Railroad Museum, 111 I St., Sacramento, CA 95814; or to Yolo Hospice, P.O. Box 1014, Davis, CA 95617.

Jack Wick

Photo courtesy of C.A.N

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. He is survived by his daughters, Kimberley Neuhauser (Mitch) and Laurie Cootz (Jim Quinn); his son, James Wick; his grandchildren, Jaime, Read and Kursten Neuhauser; Jackie Cootz; and Shelby Spurlock; and his great grandson, Tristan Spurlock.

Jack Allen Wick was born in Long Beach, California on January 29, 1929, the eighth child of Ragnhild Ingeborg Hansen and Andrew Anderson Wick, both Norwegian immigrants. Jack graduated from California Polytechnic State University in San Luis Obispo in 1951 with a Bachelor of Science degree in Ornamental Horticulture. Three months later, he was drafted into the United States Army. He served in the Korean War in 1952 in the 17th Regiment, 7th Infantry Division, advancing to Staff Sergeant. He received the Combat Infantryman Badge, Korean Campaign Medal with two bronze stars, the United Nations Service Medal, the Good Conduct Medal, and recently received the Korean War Service Medal from the Korean government.

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 includeed 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 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. This Professorship provides the Ornamental Horticulture department means to bring in guest speakers and industry experts to further enlighten the students.

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. Before passing Jack asked, "...instead of cleaning your suit or buying airfare or using gas (WHY PICK ON FLOWERS?), you can give to your favorite charity, scholarship or endowed professorship."

CANERS Foundation Awards in Jack's Name:

- Orange County Chapter/Jack Wick Scholarship Award
- Jack Wick Award
- Jack and Marion Wick Scholarship Fund
  c/o California Assoc. of Nurseries and Garden Centers,
  3947 Lennane Drive, Suite 150, Sacramento, CA 95834
- Jack Wick Endowed Professorship c/o Cal Poly San Luis Obispo, Building 82-A, San Luis Obispo, CA 93407

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***2004-05 New Releases** … cont. from page 1*

the grapes withstand a damp climate. The wine can be high in alcohol, acidity and flavor, according to Jancis Robinson. Microshoot-tip culture was used to make Alvarinho FPS 01 because the original material tested positive for leafroll, fleck and Rupestris Stem Pitting-associated virus (GRSPaV).

Cabernet Franc FPS 14 was donated to the FPS public collection by Larry Hyde (Hyde Vineyard in Carneros, California) in 2002. He calls it the Niebaum clone. All results for disease tests used to evaluate the original material (FPS 14) were negative except a PCR test for GRSPaV which was positive.

Cabernet Sauvignon FPS 42 was donated to the FPS public collection by Larry Hyde in 2002. Hyde describes this selection as an early productive clone with spice flavor, large berries and clusters. All results for disease tests used to evaluate the original material (FPS 42) were negative except a PCR test for GRSPaV which was positive.

Grand noir FPS 03 was collected from the Morisoli Heritage Vineyard in Napa, California. It was originally labeled "Grand noir del la Calamette" and is one of nine selections donated to the public FPS collection by Gary Morisoli in 2002. This variety is the result of a cross between Petit Bouschet and Aramon. It is a red flesh high yielding variety that is susceptible to powdery mildew and winter cold. All results for disease tests used to evaluate the original Grand noir FPS 03 material were negative.

Greco di Tufo FPS 01 was imported in 1999 from the Vivai Cooperativi Rauscedo (VCR) Nursery in Italy. It is privately owned by VCR and will be exclusively distributed in the United States by the Novavine Nursery in Santa Rosa, California. This selection is from an Italian clone designated VCR 11. Greco di Tufo is a white wine variety that originated in Greece. Tissue culture was used to make Greco di Tufo FPS 01 from the original material.

Saint George FPS 18 is from the Italian clone VR 9/99 which was imported from the University of Bari in 2000 for the FPS public collection. In addition to being used as a rootstock, Saint George is also used as a field indicator to test for grapevine fleck, fanleaf and Rupestris Stem Pitting-associated viruses. The selection of Saint George used until now for field indexing (FPS 15) was found to be infected with GRSPaV in the late 1990s, raising concerns about possible false positive test results. All the results for disease tests (including Rupestris Stem Pitting) used to evaluate FPS 18 were negative. FPS 18 will therefore be used for research on Rupestris Stem Pitting and as a source for commercial planting stock.

Sauvignon blanc FPS 30 was also donated to the FPS public collection by Larry Hyde in 2002. This is a musque clone that Hyde collected from Arroyo Seco Vineyards in Monterey County, California. It was labeled "Sauvignon Musque" in the Hyde vineyard. The name was changed to Sauvignon blanc at FPS because DNA analysis showed that the Hyde Sauvignon Musque matched Sauvignon blanc. All results for disease tests used to evaluate the original material (FPS 30) were negative except a PCR test for GRSPaV which was positive.

Syrah FPS 11 is another selection donated to FPS by Larry Hyde in 2002. He called this the Hyde clone. All results for disease tests used to evaluate the original material (FPS 11) were negative except the Saint George field and PCR tests for GRSPaV which were positive.

Triplett blanc FPS 01 is a white wine variety bred and developed by Mr. Fay Triplett. See the story about this variety on page 3.

Viozinho FPS 01 is another selection imported in 2000 from the Agro Ideia Nursery in Portugal. This is a white grape variety grown in the Douro and Tras-os-Montes (northeast Portugal). It is used in the production of white port. Tissue culture was used to eliminate a fleck infection detected in the original material and produce FPS 01.