



# FPS GRAPE PROGRAM NEWSLETTER

NOVEMBER 2006

<http://fps.ucdavis.edu>

UC DAVIS

## New Grape Varieties for the 2006-2007 Season

by Susan Nelson-Kluk, FPS Grape Program Manager

FPS WILL OFFER dormant hardwood cuttings for over 700 registered wine, table, raisin, juice, canning, and rootstock selections in the 2006-07 dormant season. The updated list of registered selections is available from the FPS office or on the FPS Web site at: <http://fps.ucdavis.edu>. Thirty-seven selections that were newly advanced to registered status in 2006 are underlined on the list. Dormant cuttings in short supply will be allocated among the orders that are confirmed by November 30, 2006.

Work is continuing to expand the breadth of the foundation grape stock collection at FPS. This year, 19 new grape selections were planted in the foundation block for the first time. An additional 9 selections that replace materials dropped from the California Grapevine Registration and Certification (R&C) program in the past were also planted in 2006. Customers may order Provisional status mist propagated plants from these selections for the first time this fall of 2006. Plants will be propagated after orders are received and supplied in about six to nine months. Disease testing for these selections was completed in the fall of 2005. 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 selections are shown on the *New Materials Available from FPS in the 2006-07 Season* list. This information is also available from the FPS office and Web site at <http://fps.ucdavis.edu>. Brief histories of the new materials are shown below.

### **New selections released for the first time by FPS**

Durif FPS 04, Peloursin FPS 01 and Syrah FPS 15 were collected in 2001 from an old vineyard located in the town of Saint Helena, California next to the library. In the summer of 2000, French ampelographer Dr. Jean-Michel Boursiquot identified 17 varieties in

*continued on page 34*



A newly planted grapevine in the FPS Foundation vineyard is trained by Field Manager Matt Gallagher (left) and Tom Pinkston. Photo by Bev Ferguson

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## FPS Welcomes New Customer Service Staff

By Cheryl Covert, FPS Distribution, Customer Service & Business Office Manager

### Tracy Pinkelton

With the retirement last year of our long-time customer service representative Ginnie Dixon, FPS has welcomed onboard service representative Tracy Pinkelton. Tracy came to us from the Center for Human Services at UC Davis Extension, where she worked as an administrative assistant in client services. She brings a high level of organizational, troubleshooting and computer skills, as well as an educational background in the plant sciences and the experience of growing up in a farming family. Tracy is the “go-to” person at FPS for placing your plant material orders, making changes to orders or inquiring about their status, reporting any problems with billings or materials received, requesting certification tags, and answering all of your order-related questions. You may contact Tracy by phone at (530) 752-3590 or by email at [trpinkelton@ucdavis.edu](mailto:trpinkelton@ucdavis.edu).



### Lydia Lozano-Clark

With the retirement this spring of our veteran administrative assistant/receptionist Sue Kinser, FPS is pleased to announce the addition of our new front desk commander Lydia Lozano-Clark. Lydia comes to us from the California National Primate Research Center at UC Davis, where she worked as an administrative assistant. As a long-time UCD employee, she brings to us a breadth of knowledge of university resources and well-honed business and customer service skills. Among her many and diverse responsibilities at FPS, Lydia serves as information and communication hub for our program, answering your general questions, providing requested publications, directing you to staff who can best answer your specific questions, and helping you when you come to pick up your plant materials. She also plays a big role in planning and setting up for the many meetings and events sponsored by FPS that are attended by industry representatives. You may contact Lydia by phone at (530) 752-3590 or by email at [lclark@ucdavis.edu](mailto:lclark@ucdavis.edu).



## Upcoming Meetings

**FPS Annual Meeting:** November 15, 2006 at the Buehler Alumni and Visitors Center, UC Davis. For reservations or information, contact the FPS office by phone: (530) 752-3590 or email: [fps@ucdavis.edu](mailto:fps@ucdavis.edu)

**Current Issues in Vineyard Health,** UC Davis Extension class. November 29, 2006, 9:00 am–4:00 pm at the DaVinci building in Davis. Registration and information is provided at [www.extension.ucdavis.edu](http://www.extension.ucdavis.edu)

**2007 Unified Wine and Grape Symposium** to be held January 23–25 at the Sacramento Convention Center, 1400 J Street, Sacramento, California. For more information, go to <http://www.unifiedsymposium.org>

**Variety Focus: Zinfandel,** UC Davis Extension class. May 31, 2007 at Freeborn Hall, UC Davis. Registration and information is provided at [www.extension.ucdavis.edu](http://www.extension.ucdavis.edu)

**58th Annual Meeting of the American Society for Enology and Viticulture (ASEV)** will be held June 20–22, 2007 at the Grand Sierra Resort (previously Reno Hilton) in Reno, Nevada. Details are available at <http://www.asev.org>



Foundation  
Plant  
Services

FPS Grape Program Newsletter is published by Foundation Plant Services, a department in the College of Agricultural and Environmental Sciences at the University of California, Davis.

Foundation Plant Services  
University of California  
One Shields Avenue  
Davis, California 95616-8600  
Phone: (530) 752-3590  
Fax: (530) 752-2132  
Email: [fps@ucdavis.edu](mailto:fps@ucdavis.edu)  
Web: <http://fps.ucdavis.edu>

**Director:** Dr. Deborah Golino

**FPS Plant Pathologist:** Dr. Adib Rowhani

**Editor:** Susan Nelson-Kluk

**Editorial Assistance:** Cheryl Covert

**Newsletter Design:** Bev Ferguson

This publication is also available online at:  
<http://fps.ucdavis.edu>

## Virus Status of Pinot noir FPS 23

In May 2006, Foundation Plant Services sent a notice to customers to whom it has supplied Pinot noir 23 plant material, informing them that Pinot noir FPS 23 is likely to be infected with grapevine leafroll-associated virus 7 (GLRaV-7). Known as the 'Mariafeld clone,' this Swiss selection is very popular with some grape growers and winemakers. At this time, FPS Pinot noir 23 remains registered in the California Grapevine Registration and Certification (R&C) Program.

GLRaV-7 is a new virus that was found in 2000 in a vine in Albania that was showing characteristic leafroll symptoms. GLRaV-7 was named and partially characterized by a group of scientists in Italy who determined that it is a new virus in the family of Closteroviridae (the same family as other GLRaVs), but different from all other known viruses in the grapevine leafroll disease complex. In a limited survey performed by the same group of scientists in Italy, they found that, although this virus is not widespread in the vineyards, it was present in other countries including Albania, Greece, Hungary, Egypt and Italy. The virus has not been fully characterized yet and we do not have any information regarding its vector and natural spread in the field.

The RT-PCR detection methodology that has been developed for GLRaV-7 is being used by scientists and commercial laboratories. Antibodies also have been produced for use in ELISA for the detection of this virus, and are commercially available.


GLRaV-7 was first found in Pinot noir 23 vines from several California nurseries by a private laboratory using RT-PCR. The FPS lab re-tested these samples as well as 22 vines of Pinot Noir FPS 23 from the FPS Foundation Vineyard. Both the FPS vines and samples from older nursery sources tested positive for GLRaV-7, which suggests that this selection has always been infected with GLRaV-7. This was the first time a GLRaV-7 PCR test was used to check the FPS Pinot noir 23 vines. FPS has recently received funding from the California Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB), and will begin PCR testing for GLRaV-7 and other viruses. Initially, 20% of the Foundation vines will be tested.

When Pinot noir 23 was checked in 1998 using the official test for leafroll prescribed by the California R&C and federal grape importation programs (Cabernet Franc field index), the results were negative. This suggests that GLRaV-7 (or this strain of the virus) may be mild or non-symptomatic on Cabernet Franc. FPS will be conducting extensive field, lab and greenhouse tests over the next 2 years to find out more about the health status of this selection.

Drs. Adib Rowhani (UC Davis) and Jerry Uyemoto (USDA-ARS) are collaborating on research to determine the field effects of GLRaV-7. Dr. Uyemoto has preliminary evidence that some selections of Pinot noir are not compatible with the rootstock 110R; however, the rootstock incompatibility problem does not seem to be limited to a single selection (clone) of Pinot noir, so it may not be related to the presence of GLRaV-7 in Pinot Noir 23. Further research will help clarify this issue.

Tissue culture therapy will be used at FPS to produce a selection of Pinot noir FPS 23 free of GLRaV-7. When this new selection of the 'Mariafeld clone' is available (by about 2010), it will replace Pinot noir FPS 23 in the R&C Program.

Customers may continue to purchase material from existing Pinot noir FPS 23 mother vines if they are willing to assume any potential risk associated with its use. Customers who have purchased Pinot noir FPS 23 materials from FPS in the past are encouraged to share this information with their customers who may be affected.

Questions regarding this issue may be directed to Dr. Deborah Golino by email at [dagolino@ucdavis.edu](mailto:dagolino@ucdavis.edu) or by phone at (530) 754-8102. 

# Vouchers Hold the Key to Successful Grape DNA Identification

by Jerry Dangl, Manager, Plant Identification Laboratory, Foundation Plant Services

*Foundation Plant Services has been using DNA “fingerprinting” as part of the Grape Professional Identification Program since 1997. In this process DNA is extracted, typically from leaf tissue, and a DNA profile generated using specific DNA markers. The profile by itself, however, does not identify the grape variety. A positive identification requires the profile be matched to a reference profile from an authenticated voucher vine or vines. The accuracy of the final identification is only as good as the identification of the voucher.*

For many common varieties, vouchers may be relatively easy to select. Cabernet Sauvignon, for example, is distinctive enough to identify by sight (ampelography). A vine from any well-established vineyard could serve as a voucher. Better yet, one could sample vines from several vineyards in different growing areas. If the resulting DNA marker profiles all match each other, the profile can be used as a reference profile with a very high degree of confidence. This “voucher by committee” is a great way to generate reference profiles for common varieties.

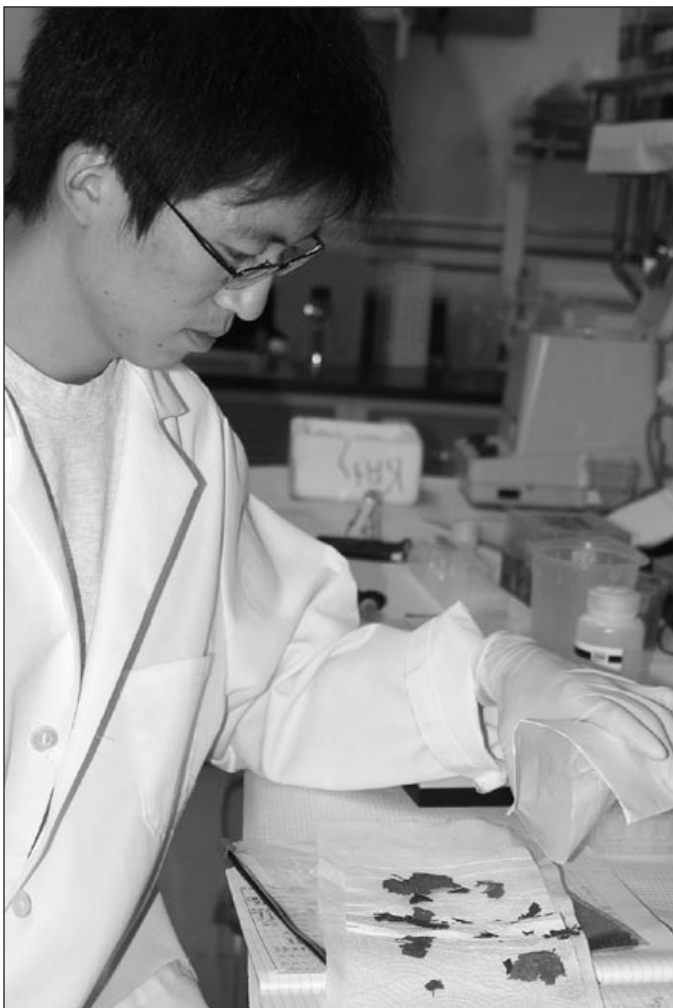
There are hundreds of grape varieties that are less common in California, many of which are in the FPS collection. One strategy to identify authentic vouchers for these less common varieties is to look in the region of origin or in a growing region where the variety is more popular; i.e. vouchers for French wine grape cultivars not commonly grown in California might best be collected in France. This approach was used to generate many grape reference profiles in the FPS database.

## Collecting vouchers and reference DNA profiles

In 1997, while a graduate student in Dr. Carole Meredith’s lab in the UCD Department of Viticulture and Enology, John Bowers went to France to collect voucher samples. Rather than visiting commercial vineyards, Dr. Bowers collected leaf samples from the French National Grape Collection near Montpellier. National and regional germplasm collections provide an excellent source of voucher material, especially for varieties of commercial or historical importance in the region. Most of these collections are well maintained; the accessions are well documented and routinely examined by expert ampelographers. This high level of scrutiny increases the confidence that the accessions are correctly identified.

Dr. Bowers extracted DNA from his leaf samples while in France, returning to UC Davis to generate the DNA marker profiles. His work provides the FPS database with many unique and important reference profiles. The use of dried leaf samples has since replaced traveling to remote sites. Dried leaves are a very stable source of quality DNA and can easily be mailed.

Completed DNA profiles can also be exchanged, eliminating expensive duplication of efforts. The DNA marker technology used at FPS (simple sequence repeats or SSR) is now universally employed as the most reliable and objective method to identify grape varieties. Many of the germplasm collections have affiliated research units that are actively engaged in generating grape DNA profiles. These profiles are easily shared and are often published in the scientific literature.



Daniel Dai, student lab assistant at the FPS Plant Identification Lab, prepares dried grape leaves for DNA analysis.

Good reference profiles come from using correctly identified voucher vines, and testing multiple sources of a variety increases the confidence in a reference profile (assuming they all match). With this in mind, each grape DNA profile generated at FPS or published in scientific journals is an opportunity to add confidence to an existing reference profile or to expand our database.

**Parental analysis**

The identity of a potential voucher vine can also be validated by parental analysis. The DNA markers used by the FPS Plant Identification Lab can be traced as they pass from one generation to the next. Although the eight markers are not sufficient to prove a parent/progeny relationship, comparing the profile of a potential voucher with those of its two parents can confirm that the profiles are consistent with the breeders’ records—a strong indication that the vines are correctly identified. If, however, the analysis of the three DNA profiles is inconsistent with the record, it cannot be determined whether 1) the identification of the potential voucher is incorrect, 2) one or both of the parent vines are incorrectly identified or 3) the breeding record is incorrect. Logically, if the potential voucher is incorrectly identified, it is exceedingly unlikely to, by random chance, have a DNA profile consistent with being an off-spring of the other two varieties.

The variety ‘Flora’ bred by the late Dr. Harold Olmo, professor and grape breeder, UC Davis Department of Viticulture and Enology, serves as an example of the identification process. FPS has two registered selections of ‘Flora,’ two vines of each selection. The DNA marker profiles of the four vines were compared and confirmed to be identical. The next step is to compare the profiles to our database. No match was found, which was expected since at that point there was no reference profile for ‘Flora.’ This also confirmed that it was not incorrectly matching any of the 800 varieties in the database. A good reference profile from an authentically identified voucher was still needed to make a positive identification using DNA markers alone.


Arguably, the best source for authentic selections of varieties bred by Dr. Olmo should be those at UC Davis. Further, the foundation block vines at FPS have been

professionally identified by visual inspection. But what more can be done using DNA markers to support the identification of the ‘Flora’ vines at FPS? The breeding records show ‘Flora’ was selected from the cross of ‘Semillon’ and ‘Gewürztraminer,’ and our database has excellent reference profiles for both. When we analyzed the profiles of ‘Flora,’ ‘Semillon’ and ‘Gewürztraminer,’ the results were in fact consistent with the record. Table 1 shows an example of how DNA markers are passed from one generation to the next.

As mentioned above, the eight markers routinely used at FPS are not sufficient to prove a parent/progeny relationship. In this case, however, we are not trying to prove the relationship; we are validating the identification of FPS’ ‘Flora’ selections. To this end: all the vines have been verified by expert visual inspection, the DNA marker profiles for multiple vines from the region of origin match, and analysis of the profiles is consistent with the known pedigree. These all support the conclusion that our ‘Flora’ vines are correctly identified and the DNA profile of them is an excellent reference profile.

This method of analysis has been used to verify the identification of all of Dr. Olmo’s named varieties at FPS. The parental analysis described above was consistent for all of his varieties except ‘Emerald Riesling,’ recorded as a selection from the cross of “Muscadelle (CA)” and ‘Riesling.’ We had previously determined that the cryptic “Muscadelle (CA)” was a vine labeled “Muscadelle du Bordelais” from an old block of vines in the Department of Viticulture and Enology’s collection that served as one parent for ‘Emerald Riesling.’ ‘Riesling,’ however, had DNA markers that were not consistent with what would be expected from the other parent.

Dr. Andy Walker of the Department of Viticulture and Enology suggested that ‘Grenache’ be considered, since it has traits in common with ‘Emerald Riesling.’ Analysis of our database verified that ‘Grenache’ and “Muscadelle du Bordelais,” were the true parents of ‘Emerald Riesling.’

DNA analysis is a fascinating way to unravel mysteries of grape parentage and document the varietal identification—part of the daily business of the FPS Plant Identification Lab. 

**Table 1.** ‘Flora’=‘Semillon’ X ‘Gewürztraminer.’ Grape DNA Profiles for 6 markers showing the inheritance of alleles. Each DNA marker has 2 alleles. At each marker, 1 allele must be inherited from each parent. Alleles passed from ‘Semillon’ to ‘Flora’ are underlined, while those from ‘Gewürztraminer’ are shown in bold. Alleles are designated as sizes in base pairs.

Variety	Marker 1	Marker 2	Marker 3	Marker 4	Marker 5	Marker 6
<b>Semillon</b>	<u>236</u> 238	<u>239</u> 257	175 <u>185</u>	204 <u>210</u>	<u>133</u> 133	247 <u>251</u>
<b>Flora</b>	232 <u>236</u>	<u>239</u> <b>243</b>	<u>185</u> 189	<b>204</b> <u>210</u>	<u>133</u> 151	<b>245</b> <u>251</u>
<b>Gewürztraminer</b>	232 238	<b>243</b> 257	189 189	204 216	151 151	<b>245</b> 251

# SAVII Shiraz Clonal Selection

by Wayne Farquhar, Executive Officer, South Australian Vine Improvement Inc.

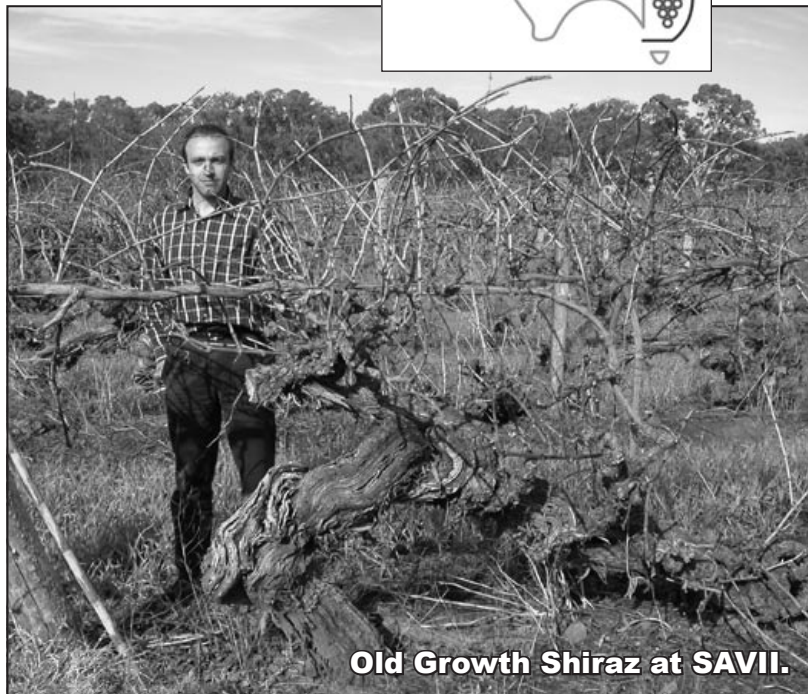


AUSTRALIA IS IN A UNIQUE POSITION in the world as it still has over 80% of its grapevines growing on own roots. Only a small area of Australia has phylloxera infestation, so the need for rootstocks is minimal. This has resulted in extremely old vineyards still growing on the original plantings dating back to the 1830-40's. Hundreds of years of European clonal selection still exists on own roots in these old Australian vineyards.

From these old vineyards, South Australian Vine Improvement Inc. (SAVII), carries out selection work looking for new and improved clones. A range of differing varieties make up these old plantings such as Shiraz (Syrah), Mataro (Mourvedre), Grenache, Semillon, Cabernet Sauvignon, Riesling and to a lesser degree many other varieties.

Of the 33 different Shiraz clones listed in the National Register of Grapevine Varieties and Clones, all of these were selected between 1960 and 1970. These selections were based purely on yield, not on quality.

After the vine pulls in the late 1970's the SAVII regional groups started extensive selection work looking at old vineyards before any more of them were lost due to vine pulls. This work started by the regions during the 1980's is still carried out by SAVII today. However, today the selections are assessed by wine evaluation as well as yield statistics.



Selections are carried out on old vineyards by observation over a number of seasons looking for the "different." Vines are observed for vine health, canopy variation, vine fruitfulness and varying bunch structure. Cuttings are then taken and PCR tested for virus, and virus-negative cuttings are placed in fully replicated trials along with current industry benchmarks to evaluate their performance.

From the data in Table 1 it is clear to see that Shiraz clones SAVII 19 and 17 are well ahead of the two industry benchmarks used in the trials, namely Shiraz clones SAVII 13 and 1654. 🍇

**Table 1.** Shiraz SAVII 13 has the lowest bunch weight, but the highest number of bunches per vine. Shiraz SAVII 17 and SAVII 19 have lower bunch weight than the industry benchmark "Shiraz 1654," and also lower vine weight. Of great interest are the berry diameter and the colour density, as both Shiraz SAVII 17 and SAVII 19 have larger berries than Shiraz 1654 but considerably more colour. We have found this same outcome in numerous other trials where berry size has no relationship to colour, eg. the smallest berry does not mean highest colour or the best wine quality. Shiraz SAVII 17 is a larger yielder than SAVII 19, but Shiraz SAVII 19 is ahead on overall wine quality. Shiraz SAVII 19—due to its open bunch structure and lower yield—would be best suited to cooler areas where lower yielding and higher disease resistance would be of best advantage.

Clone	Total Red Pigments	Total Colour Density	Average Bunch Weight (gm)	Average Berry Diameter (mm)	Average Vine Weight (gm)
<b>1654</b>	18.98	8.26	160	11.8	8.9
<b>SAVII 13</b>	18.07	7.01	120	12.6	10.0
<b>SAVII 17</b>	21.81	8.91	140	12.2	9.0
<b>SAVII 19</b>	22.01	10.29	150	12.6	8.4

### Shiraz SAVII 17 and SAVII 19 bunch clusters

Both selections rated highly according to SAVII evaluations. SAVII 19 (below) has a looser bunch structure and lower yield; favorable attributes for cooler areas.

Shiraz SAVII 17 and SAVII 19 will be available soon from FPS.

*-Photos courtesy of Wayne Farquhar*



# New Nematode-resistant Grape Rootstocks are Nearing Release

by Dr. Andrew Walker, Professor and Grape Breeder, Department of Viticulture and Enology, UC Davis

The UC Davis rootstock breeding program is preparing for release of its first rootstocks. These rootstocks were designed to provide broad and durable resistance to nematodes, to propagate well, and have good horticultural characters such as long internodes. This work has been made possible by the very generous support of the California Grape Rootstock Improvement Commission, which has provided about \$2 million in support over the past 13 years. Additional support has been received from the Fruit Tree, Nut Tree, and Grapevine Improvement Advisory Board, the California Table Grape Commission, and the American Vineyard Foundation.

In 1993 and 1994, many crosses were made with the goal of developing rootstocks with broad and durable nematode resistance, while improving horticultural characters such as rooting ability and shoot length. The parents of these crosses included a number of grape species known to be highly resistant to both root-knot and dagger nematodes. They included several forms of *Vitis arizonica*, *V. candicans*, *V. champinii*, *V. cinerea*, *V. rufotomentosa*, and *Muscadinia rotundifolia*. *Vitis riparia* and *V. rupestris* were used in the crosses to improve rooting. About 75 crosses were made, leading to the establishment of over 5,000 seedlings in the vineyard. In 1996 these plants were evaluated for shoot growth, internode length, and the presence of laterals. One thousand selections were chosen, and that winter they were tested for their ability to root from dormant two-node cuttings. The best 100 were advanced to nematode testing.

In preparation for nematode testing, we obtained soil samples from Mike McKenry that contained populations of root-knot nematodes capable of feeding and damaging Harmony rootstock. Peter Cousins (PhD student in my lab at that time) isolated two strains of root-knot nematode (RKN) that fed well on Harmony; we named these strains HarmA and HarmC. Kris Lowe (a more recent PhD student) characterized these strains as *Meloidogyne arenaria* and *M. incognita*, respectively. We also obtained a standard strain of *M. incognita* termed R3, capable of damaging grapes, but not able to feed on Harmony or Freedom. Next, we identified several sites in Napa Valley with high populations of *Xiphinema index*, the dagger nematode vector of fanleaf degeneration, to use for the resistance screens.

We then began optimizing nematode screening procedures. Observing galls that form as a result of RKN feeding can be difficult. Peter Cousins modified an egg mass staining technique that was developed for RKN on tomato so that we could see egg masses on the roots and therefore know that RKNs had penetrated and fed on the roots. We then teamed with Howard Ferris and his

technician, Liang Zheng, from the Department of Nematology at UC Davis, and began large scale screening for nematode resistance. Root-knot nematode resistance was evaluated by counting the number of stained egg masses produced on a root system after inoculation with 1,500 juvenile nematodes; those without egg masses were assumed to be resistant. Dagger nematode resistance was determined by counting the number of galled roots after inoculation with 150 nematodes. We also tested for resistance against citrus (*Tylenchulus semipenetrans*), lesion (*Pratylenchus vulnus*) and ring (*Mesocriconema xenoplax*) nematode in separate pot studies using either 2- or 4-inch plastic pots.

The first round of testing examined the ability of the 100 selections to resist RKN R3. Selections that resisted R3 feeding were then tested for resistance to HarmA and HarmC, followed by testing for resistance to the dagger nematode. This second round of screening identified 33 selections with strong resistance to each of the four nematode strains. These 33 selections were then tested against a combined inoculum using the four nematodes (R3, HarmA, HarmC and dagger), which resulted in a group of 14 selections with broad resistance. These 14 selections were also tested for resistance to citrus, lesion and ring nematodes.

Finally, these selections were tested at elevated temperatures to each of the nematodes (R3, HarmA, HarmC and dagger) to evaluate the durability of their RKN resistance. Resistance to RKN strains has been shown to breakdown at higher temperatures (about 80°F) in tomato and other crops. The 14 selections were tested to determine whether their RKN resistance was based on a similar temperature sensitive mechanism. The selections were tested at four temperatures 75, 80, 86 and 90 °F (24, 27, 30, and 32 °C), using Colombard as the susceptible control and Harmony as the standard. At 80°F, Harmony's moderate resistance to HarmA is dramatically affected and it becomes as susceptible as Colombard.



Six selections emerged from this screening and are now being considered for release. Five of these rootstocks have been planted in field trials in sites with severe chronic nematode pressure. The sixth selection, 8909-05, was not planted in the first round of trials because I had assumed it would not propagate well, due to its *M. rotundifolia* parentage. However, we have been successfully bench-grafting it over the last two years. We have also evaluated the rooting angles generated from herbaceous cuttings as a rough approximation of rooting depth and therefore ability to induce vigor. We have studies underway across a wide range of rootstocks to better establish this correlation between rooting angles from herbaceous and dormant cuttings, and known vigor levels in commercial rootstock standards.

It will take years to determine which sites each of these rootstock selections are best suited to, but they have unparalleled levels of resistance to nematodes and should excel in sites with single and mixed nematode species infestations. We are currently testing these selections in large pots filled with vineyard soil from sites with severe nematode infestation as a final test before release. These soils have high levels of RKN as well as ring nematode, lesion nematode and *Xiphinema americanum*. We planted Harmony in 4 inch pots using one of these soils and recovered over 100 RKN egg masses in seven weeks.

The most resistant selection of the group is 8909-05. This selection came from a group of 16 *V. rupestris* x *M. rotundifolia* seed populations that Harold Olmo gave me when I was hired. Recently, we discovered that almost all of these seedlings were not the result of intended crosses, but instead the result of pollen contamination from grape species he collected in Mexico. Many of



these selections have exceptional resistance to Pierce's disease and to the dagger nematode. 8909-05 is one of the true *M. rotundifolia*

hybrids and may possess the ability to tolerate fanleaf virus infection in the manner of O39-16. This tolerance is critical since resistance to *X. index* feeding does not prevent vectoring of and infection by fanleaf virus. We are working to demonstrate that 8909-05 is capable of

preventing fanleaf disease. Herbaceous cuttings of 8909-05 produce relatively few roots at a slower pace than the other selections, and they have deep rooting angles, although not as deep as O39-16.

9363-16 acquires its nematode resistance from *V. rufo-tomentosa* and *V. champinii* 'Dog Ridge'. It appears most like *V. rufo-tomentosa* with its lobed leaves, but they are relatively hairless, a trait from *V. riparia*. It propagates well, and produces roots with relatively shallow rooting angles. 9363-16 is a good mothervine and has excellent nematode resistance, although it is susceptible to ring nematode.



9365-43 has nematode resistance from *V. rufo-tomentosa*, *V. champinii* 'Dog Ridge' and c9038—a wild collection from Texas that appears to contain *V. monticola*, a species with exceptional drought and mineral tolerance. *Vitis monticola* is the only *Vitis* species that is truly drought tolerant and grows on pure limestone on mesquite and juniper in central Texas. 9365-43 looks like a form of *V. champinii* and produces moderate vigor mothervines with long canes and moderate lateral production. Cuttings root very well and their rooting angles are intermediate in depth. It has excellent nematode resistance and has moderate resistance to ring nematode. 9365-85 is a sibling of 9365-43, but appears much more *V. riparia*-like. This appearance may translate into reduced vigor, but the rooting angles of the two siblings are similar. 9365-85's nematode resistance is slightly lower than 9365-43, but it is a more vigorous mothervine.



9407-14 has strong and broad nematode resistance from *V. champinii* ‘Ramsey’, and c9021, a *V. champinii/monticola* selection from central Texas. However, it is susceptible to ring nematodes.



The mothervine resembles a glossy-leaved version of this latter species, but the mothervine is relatively weak, although the canes are long, straight and have limited lateral production. Cuttings produce moderately-sized roots with relatively deep rooting angles.

production. Cuttings produce moderately-sized roots with relatively deep rooting angles.

9449-27 is the last of the selections and probably will not be released due to relatively poor rooting. It is a cross of *V. rufotomentosa* and *V. cinerea*, and looks like a good hybrid between these two species, with *V. aestivalis*-like leaves that lobe when the shoots are weak or shaded. It has been used as a parent in many other crosses for diversity and complex nematode resistance.

The lack of fallow and crop rotation in vineyards are the key factors leading to nematode’s impact on poor vineyard establishment and reduced longevity. These rootstock selections were designed to durably resist a broad range of nematodes, enabling their use in infested sites without the use of nematicides or fallow. They also present a diverse range of nematode resistant rootstocks for choices in rotating rootstocks when vineyards are replanted. 🍇

**Table 1.** Parentage and nematode resistance of rootstock candidates currently undergoing certification testing at FPS. Combined testing involved the standard strain of *Meloidogyne incognita* (root-knot nematode), two aggressive Harmony/Freedom strains, and dagger nematode *Xiphinema index*.

Selection	Parentage	Characteristics
9363-16	( <i>V. rufotomentosa</i> x (Dog Ridge x Riparia Gloire)) x Riparia Gloire	No galls in combined testing, resists lesion nematodes and has moderate resistance to citrus, but susceptible to ring nematodes. Good mothervine with long canes and internodes and limited lateral production. Mature leaves are three- to five-lobed and have some similarity to <i>V. aestivalis</i> .
9365-43	( <i>V. rufotomentosa</i> x (Dog Ridge x Riparia Gloire)) x <i>V. champinii</i> c9038 (probably <i>V. candicans</i> x <i>V. monticola</i> )	No galls in combined testing, resists lesion and citrus nematodes, has moderate resistance to ring nematodes. Mothervine has moderate vigor, but long canes with good internode length, moderate number of laterals. Mature leaves resemble <i>V. champinii</i> . Female flowers.
9365-85	( <i>V. rufotomentosa</i> x (Dog Ridge x Riparia Gloire)) x <i>V. champinii</i> c9038 (probably <i>V. candicans</i> x <i>V. monticola</i> )	Less than one root gall in combined testing, resists citrus and lesion nematodes, and has moderate resistance to ring nematode. Good mothervine with long canes and internodes and few laterals. Mature leaves resemble <i>V. riparia</i> . Male flowers.
9407-14	(Ramsey x Riparia Gloire) x <i>V. champinii</i> c9021 (probably <i>V. candicans</i> x <i>V. monticola</i> / <i>V. berlandieri</i> )	No galls in combined testing, resists citrus and lesion nematode, but susceptible to ring nematodes. Weak mothervine, but long internodes, good canes. Mature leaves resemble glossy <i>V. champinii/monticola</i> . Male flowers.
9449-27	<i>V. rufotomentosa</i> x <i>V. cinerea</i> c9008	One gall in combined testing, resists citrus and lesion and has moderate ring nematode resistance. Strong mothervine, moderate rooting ability. Mature leaves resemble <i>V. rufotomentosa</i> with the quilting of <i>V. cinerea</i> ; lots of hair and bicolor leaf surfaces. Shade and lateral leaves can be three- to five-lobed. Male flowers.
8909-05	<i>V. rupestris</i> x <i>M. rotundifolia</i>	No galls in combined testing, resists citrus, lesion and ring nematode. Less easy to medium propagation ability. May have fanleaf tolerance. Leaves are shiny and intermediate between <i>V. rupestris</i> and <i>M. rotundifolia</i> . Sterile flowers.

# Tempranillo at FPS

by Susan Nelson-Kluk, FPS Grape Program Manager

TEMPRANILLO IS A GRAPE VARIETY ALSO KNOWN by the names Valdepenas, Tinta Roriz, and Valdepenas at FPS. It is also one of the varieties that has been included in the California Grapevine Registration and Certification (R&C) program since the early years. A selection labeled with the synonym “Valdepenas FPS<sup>1</sup> 01” came from a UCD vineyard source described as “K134V21” and appears on the lists of registered selections from 1962 to 1968. No European origins are shown in the records, but the name suggests that this selection came from a region in Spain called Valdepenas where red wine is made from a variety called Cencibel which is a synonym for Tempranillo. Valdepenas FPS 01 was heat treated for 80 days to produce Valdepenas FPS 02. Both Valdepenas FPS 01 and 02 were off the registered list by 1973, probably because of positive leafroll test results. This source of Valdepenas is no longer in the UC Davis collection but it may still exist in the industry.

The first selection actually labeled Tempranillo came to FPS from the Instituto Nacional de Investigaciones Agronomicas in Madrid, Spain in 1971. It was included on the registered list in 1979, but was removed by 1981 because it tested positive for Rupestris Stem Pitting (RSP). As of January 1, 2001, RSP was dropped from the list of diseases excluded by the R&C program. By that time, however, a new selection had been produced using micro shoot tip tissue culture from the original Tempranillo FPS 01 selection. The tissue culture selection tested negative for RSP and so it was planted into the foundation block in 2003 and labeled Tempranillo FPS 06. Tempranillo FPS 06 became registered for the first time this year (2006).

By 1973 another selection named Valdepenas appeared on the registered list. It was rescued from the Jackson Vineyard in Amador County by Dr. Austin Goheen, USDA-ARS plant pathologist. His story about the Jackson Vineyard is included in another article in this issue of the newsletter. The original material passed all the virus tests and qualified for Foundation stock status without using any virus elimination treatments. The Jackson selection is identified as Valdepenas FPS 03. It was shown to match Tempranillo using DNA analysis in 2000. Valdepenas FPS 03 has been widely distributed and is still available from FPS as Foundation stock.

Tinta Roriz is one of the many varieties the late Dr. Harold Olmo, UC Davis viticulture professor, arranged to have sent from the Regua Agricultural Station in the Douro Region of Portugal in 1984. The original Tinta Roriz material tested positive for leafroll, so microshoot tip culture was used to eliminate the virus and create Tinta Roriz FPS 01. The French ampelographer, Dr. Jean-Michel Boursiquot, inspected Tinta Roriz FPS 01 mother vines in 2000 and commented that Tinta Roriz is a synonym for Tempranillo. It was shown to match Tempranillo using DNA analysis in 2003. The name Tinta Roriz was kept to acknowledge the Portuguese source, however it is not yet a synonym recognized for Tempranillo by the Federal Alcohol and Tobacco Tax and Trade Bureau (TTB). Foundation stock for Tinta Roriz FPS 01 has been available from FPS since 2000.



**Tinta Roriz 01 at FPS**

In 1987 Goheen imported a selection of Tempranillo from the AGRO 2001 Nursery in Spain. The original material passed all the virus tests so it was planted into the foundation block in 1990 and registered in 1995 as Tempranillo FPS 02.

A selection labeled “Malvasia nera” was imported from Italy in 1995. It was planted into the foundation block in 1999 and labeled “Malvasia nera FPS 01” before it fruited. However when Boursiquot inspected the vines in 2000 he said they looked like Tempranillo. In 2003

<sup>1</sup> In the interest of simplicity, “FPS” is used in this article to identify both grape selections in the current Foundation Plant Services (FPS) grape collection and older selections that were included in the collection when the program was called Foundation Plant Materials Service (FPMS). The name changed from FPMS to FPS in 2003.

DNA analysis confirmed Boursiquot's report so the name was changed to Tempranillo FPS 07 and the vines were registered in the R&C program.

Glenn McGourty, Mendocino County viticulture farm advisor, sent a selection of Tempranillo to FPS in 1998. He acquired it from a California vineyard, but the original source was reported to be clone 43 from the Eia Logrono Institute in Spain. McGourty was told that it is considered a good clone that "is propagated by a famous large grower in the south of Spain who wishes to remain anonymous." McGourty said he thinks that it is part of "...an older generation of Tempranillo that was clonally selected for health and production rather than ultra quality wine as are the newer clones being selection by Jesus Yuste..." The original material of this clone tested negative for all diseases of concern for the R&C program, so it was labeled "Tempranillo FPS 03" and planted into the foundation block in 2000. DNA analysis showed Tempranillo FPS 03 matched other Tempranillo selections at FPS. The mother vines were registered in the R&C program in 2001 and remain registered for the upcoming season.

In 2000 Jesus Yuste sent nine Spanish clones (including two Tempranillos) from the Instituto Tecnológico Agrario de Castilla y Leon (ITACyL) in Valladolid, Spain to FPS. One of the Tempranillo clones was labeled "Tempranillo CL 242" and the other was labeled "Tinta de Toro CL 292," a known synonym for Tempranillo. The materials in the 2000 shipment from Spain were designated private until an agreement was reached with ITACyL in 2005 that allowed FPS to add all nine clones to the FPS public collection. Part of the agreement included funding to bring Jesus Yuste to California in 2005. During the visit he inspected and confirmed the identity of all the plants propagated from the materials sent in 2000. At that time he explained that Tempranillo CL 242 was associated with the synonym Tinta del Pais in Spain. He also agreed to changing the primary name from Tinta de Toro to Tempranillo for clone CL 292. Both introductions were advanced to registered selections at FPS in 2005. They are now designated Tempranillo FPS 05 (synonym = Tinta del Pais) and Tempranillo FPS 11 (synonym = Tinta de Toro). The Spanish clone numbers CL 242 and CL 292 are shown in the source information for Tempranillo FPS 05 and 11 respectively.

In 2006 Jesus Yuste sent FPS another two clones of Tempranillo from the ITACyL. Clone CL 98 is a Tinta del Pais type and clone CL 306 is a Tinta de Toro type. Tempranillo will be used as the prime name to identify both of these selections. The other names will be shown as synonyms. Tests to attempt to qualify the original ma-

terial sent for release from quarantine will be completed in the spring of 2008.


There is one ENTAV-INRA trademarked clone of Tempranillo at FPS. It was advanced to registered status in 2004 and is identified at FPS and ENTAV as "Tempranillo ENTAV INRA® 770." According to Laurent Augdon, Clone 770 is the most propagated certified clone of Tempranillo in France. ENTAV retains the exclusive rights to control the distribution and propagation of its trademarked materials. In the USA they are only available to the public from nurseries licensed by ENTAV (California Grapevine Nursery, Herrick Grapevines, Mercier California and Sunridge Nurseries).

The story of the "Duero selection" of Tempranillo found by Markus Bokisch of Bokisch Vineyards was recently published in the Wine Business Monthly (August 2005). It is reported to be a Tinto Fino type from the Ribera del Duero region in Spain with small berries and small clusters. Bokisch donated the Duero selection to the FPS public collection in 2001, and the original material qualified to be planted into the foundation block this year (2006). Customers may now order Provisional status mist propagated plants of the Duero selection under the name "Tempranillo FPS 12."

In 2004 Jorge Boehm sent a selection labeled "Valdepenas" to FPS from the Viveiros Plansel Nursery in Portugal. DNA analysis conducted in 2005 showed it is the same variety as the California Valdepenas, so, for now, Valdepenas, Valdepenas, Tempranillo, and Tinta Roriz will be considered synonyms. The name will continue to be spelled "Valdepenas" for this 2004 introduction until ownership and preferences for this selection have been determined. Tests to check the health status of the original Valdepenas will be completed by spring 2007.



Tempranillo FPS 02 fruiting in the FPS foundation block. Dr. Austin Goheen imported this selection from Spain in 1987, and it became registered in 1995.

There are now a total of 13 provisional, registered, and quarantined Tempranillo, Valdepenas, Valdepenas, and Tinta Roriz selections in the FPS collection. They are summarized in Figure 1. 

**Figure 1.** Tempranillo/ Valdepenas/ Valdepenas/Tinta Roriz Selections at FPS

FPS sel/ group #	Reported Source	Registration Status	Available	Disease test status	Treatment
<b>Tempranillo</b>					
<b>02</b>	AGRO 2001 Nursery, Spain in about 1987	registered (1995)	yes	all tests negative	none
<b>03</b>	clone 43 from Eia Logrono Institute, Spain	registered (2001)	yes	RSP+	none
<b>05</b>	CL 242 ITACYL, Spain in 2000; syn = Tinta del Pais	registered (2005)	yes	all tests negative	none
<b>06</b>	Madrid, Spain in 1971, PI 358541, from FPS 01	provisional (2003)	yes	all tests negative	shoot tip culture
<b>07</b>	Italy in 1995, previously identified as Malvasia nera FPS 01	registered (2003)	yes	RSP+	none
<b>11</b>	CL 292 ITACYL, Spain in 2000; syn = Tinta de Toro	registered (2005)	yes	all tests negative	none
<b>12</b>	Ribera del Duero, Spain	provisional (planted 2006)	MPPs can be ordered in fall 2006	RSP+	none
<b>770</b>	ENTAV INRA ® 770 Authorized Clone from ENTAV, France in 2000	registered (2004)	contact Sunridge Nursery	all tests to qualify for foundation stock negative	none
<b>8074</b>	CL 98 from ITACYL, Spain in 2006; syn = Tinta del Pais	quarantine	no	tests in progress 06-07	none
<b>8075</b>	CL 306 from ITACYL, Spain in 2006; syn = Tinta de Toro	quarantine	no	tests in progress 06-07	none
<b>Tinta Roriz</b>					
<b>01</b>	Portugal in 1984	registered (2000)	yes	RSP+ by PCR	shoot tip culture
<b>Valdepenas</b>					
<b>03</b>	Jackson Vineyard, CA sometime before 1963	registered about 1970	yes	RSP+ by PCR	none
<b>Valdepenas</b>					
<b>7847</b>	Viveros Plansel SA, Portugal in 2004	quarantine	no	tests in progress 05-06	none

# Cornell Releases Three New Wine Varieties: Noiret, Corot noir and Valvin Muscat

*Reprinted with permission from the Cornell Chronicle*

CORNELL OFFICIALLY DEBUTED three new wine grapes July 10, 2006: Noiret, Corot noir and Valvin Muscat, which are broadly adapted to the wine-growing regions in the East and produce high-quality varietal wines superior to those currently available to eastern growers today, says grape breeder Bruce Reisch, professor of horticultural sciences at Cornell's New York State Agricultural Experiment Station in Geneva, N.Y.

Reisch developed and tested the grapes with Thomas Henick-Kling, professor of enology at the Experiment Station and leader of Cornell's enology program.

The announcement of the release was made at the 31st annual American Society for Enology and Viticulture/Eastern Section Conference and Symposium, held July 9-11 in Rochester, N.Y.

TOP PHOTO - Noiret (pronounced nwahr-ay), a mid-season red wine grape, is a complex interspecific hybrid resulting from a cross made in 1973 between NY65.0467.08 and Steuben. Corot noir, a mid- to late-season red wine grape, is a complex interspecific hybrid resulting from a cross in 1970 between Seyve Villard 18-307 and Steuben.

"Both Noiret and Corot noir represent distinct improvements in the red wine varietal options available to cold-climate grape growers," said Reisch.

"Wines are free of the hybrid aromas typical of many other red hybrid grapes," Henick-Kling added. "Noiret is richly colored and has notes of black pepper, with raspberry and mint aromas and a fine tannin structure. The mouthfeel of Corot noir is round and heavy, and the tannins are big and a bit edgier than in Noiret" he said. Care should be taken to grow Noiret on sites less susceptible to extreme winter temperatures and downy mildew.

CENTER PHOTO - Corot noir can be used for varietal wine production or for blending. The distinctive red wine has a deep red color and attractive berry and cherry fruit aromas, the researchers said.

BOTTOM PHOTO - Valvin Muscat is a mid-season white wine grape with a distinctive muscat flavor and aroma that is desirable for blending as well as for varietal wines. The complex interspecific hybrid grape resulted from a cross in 1962 between Couderc 299-35 (an interspecific hybrid known as Muscat du Moulin) and Muscat Ottonel.

"Valvin Muscat is recommended for the production of high-quality muscat wines," said Reisch. "Vines are well suited to good grape-growing sites in the eastern United States, and should only be grown on suitable rootstocks." Some care should be exercised to control disease, and fruit should be picked when the muscat flavor reaches its peak, he noted.

"Historically, one of the unique strengths of Cornell's wine grape breeding program is the extent to which the breeders and enologists work together to select new grape crosses based on the flavor profile of the wine we are seeking to develop," said Henick-Kling. "All three of these new grapes were extensively



*Continued on page 15*

# The National Grape Registry: A New Website Fills an Information Gap

by Ed Stover, Curator and Research Leader, USDA-ARS National Clonal Germplasm Repository, Davis, and Nancy Sweet, Foundation Plant Services

A PROJECT IS UNDERWAY to develop a National Registry for Grape Varieties and Clones (NGR) which will provide user-friendly, single-site access to information on virtually all grape material in the U.S. It is currently difficult to get information on availability and status for many grape varieties. Growers and researchers have expressed strong interest in tracking down distinctive grape varieties or clones and it is expensive and wasteful to re-import varieties that are already in the country. Development of a national grape registry has been identified as one of the highest priorities of the National Grape and Wine Initiative (NGWI) and the National Clean Plant Network (NCPN).

FPS and the National Clonal Germplasm Repository (NCGR) in Davis have received a two-year grant from the Viticulture Consortium to develop this registry. Nancy Sweet has been assigned full-time work on this project; collecting and assembling varietal information, developing the registry framework, and both helping to create and posting information to the NGR website. The initial development effort is expected to require two years.




Nancy Sweet

Dr. Deborah Golino, FPS director, states, "We are extremely fortunate to interest Nancy Sweet in this project. She has the extraordinary combination of skills, knowledge and sheer tenacity necessary to achieve these ambitious goals. In addition to finishing her Master's Degree in Viticulture, Nancy is a lawyer who served as a judge in Sacramento County for 12 years. She is an astonishing force!"

One of the first steps in developing the registry is deciding what information should be included. Facts related to the identity and origin of each grape, with appropriate uses, will help growers track down varieties or clones. There is confusion in naming for many grape varieties, with many synonyms and even sharing of names.

The NGR will contain a complete list of synonyms and naming discrepancies for the varieties available in the United States. Information on disease testing (methods, dates, and cleanup procedures used) and identity verification will fill a much-needed gap in existing databases. Sources for grapes described in the NGR will include the National Plant Germplasm System (Davis, California and Geneva, NY), the FPS collection, the Pacific Northwest Grape Program, other university collections, and any nursery collections wishing to be included.

Several viticultural experts will provide guidance on the database content and structure, but it is critical to get input from the grower community that will be the primary user of the NGR. Discussions with expected users of the NGR have been initiated, but input is both crucial and welcomed. Workshops to obtain client input will occur on a regular basis during development and after the website is up and running. An important element of the new registry is to develop a plan for regular updating to maintain accuracy and completeness.


Nurseries interested in including their data should contact Nancy Sweet at [nlsweet@ucdavis.edu](mailto:nlsweet@ucdavis.edu). 

*Cornell releases 3 new wine grapes...Continued from page 14*

screened and evaluated by the Cornell enology group, in the field by Bruce Reisch, and by cooperators in industry wineries. It is a team effort."

With the new varieties, whose names are trademarked, the Experiment Station now has nine wine grapes to its credit. The previous Cornell releases are: Melody, Horizon, Cayuga White (grown widely throughout New York and beyond), Chardonel (now the No. 2 grape in Missouri), Traminette

(quickly gaining in popularity throughout the East) and GR7 (used in red wine blends).

Vines of the three new grapes are available from licensed commercial nurseries. Contact Reisch, [bir1@nysaes.cornell.edu](mailto:bir1@nysaes.cornell.edu) for a list of sources. Commercial nurseries may be licensed by contacting Cornell Research Foundation, 20 Thornwood Drive, Suite 105, Ithaca, NY 14850. Phone: 607-257-1081; fax: 607-257-1015; e-mail [des33@cornell.edu](mailto:des33@cornell.edu). 

# Sangiovese at FPS

by Susan Nelson-Kluk, FPS Grape Program Manager and JaRue “Jim” Manning, Professor Emeritus, Department of Microbiology, UC Davis

SANGIOVESE HAS BEEN CULTIVATED in Italy for well over a thousand years, and is presently the most widely planted grape cultivar there, covering some 235,000 acres or approximately 10% of total vineyard acreage. Although considered indigenous to Tuscany, Sangiovese is grown throughout Italy, indicating its adaptability to different environmental conditions. This adaptability has, over the centuries, given rise to significant variability in the properties of the vine and the fruit so that now many Italian viticulturists regard Sangiovese as a population rather than a cultivar (single genotype).

Development of a nomenclature for Sangiovese is in fact a “work in progress”. For well over a century Sangiovese has been referred to by a plethora of names, synonyms, clones and, more recently, biotypes (Molon, 1906; Calo, et. al., 2001; Calo, Costacurta, et. al., 2004; Giavedoni and Gily, 2005). These names and synonyms include Sangiovese grosso, Sangiovese piccolo, Sangiovetto, Sangiogheto, San Giovetto, San Zoveto, Prugnolo, Morellino, Brunello, and Nielluccio among numerous others.

For well over a hundred years Italian growers have recognized two main types of Sangiovese, grosso and piccolo, based upon perceived differences in cluster size and shape, berry size and weight, morphology of leaves, etc. (Molon, 1906; Boselli, 2001; Calo et. al., 2001). Although some viticulturists believe that a clear distinction between Sangiovese grosso and piccolo does not now exist, others believe that a distinction between the two types can be made (Boselli, 2006). However, due to evolving diversity the terms “grosso” and “piccolo” may not always correspond well with vines of larger or smaller berries and clusters. Related to this is the report of Silvestroni and Intrieri (1995) who suggested fruit size differences observed in the past might have been due to unknown virus infections. If so, more consistent sizes would be expected after removing virus from propagation stock.

More recently, Italian researchers have organized Sangiovese by grouping similar vines into biotypes for which distinct morphological and technical differences can be observed in the grape/vine. For example, Boselli (2006) considers Brunellino, Brunelletto, and Prugnolo gentile to be biotypes of Sangiovese. Calo et. al., (1995) described six Sangiovese biotypes based on fruit, cluster, leaf, ripen-

ing and must characteristics--two from central Tuscany, one from the Tuscan coast near Pisa (Peccioli di Pisa), one from the Emilia-Romagna region near Predappio (Romagnolo), one cultivated along the Adriatic sea coast (Marchigiano), and one from Corsica (Nielluccio). In addition, a recent paper reports on 14 biotypes of Sangiovese grown in the University of Florence vineyards (Pisani, Boselli, et. al., 2004)

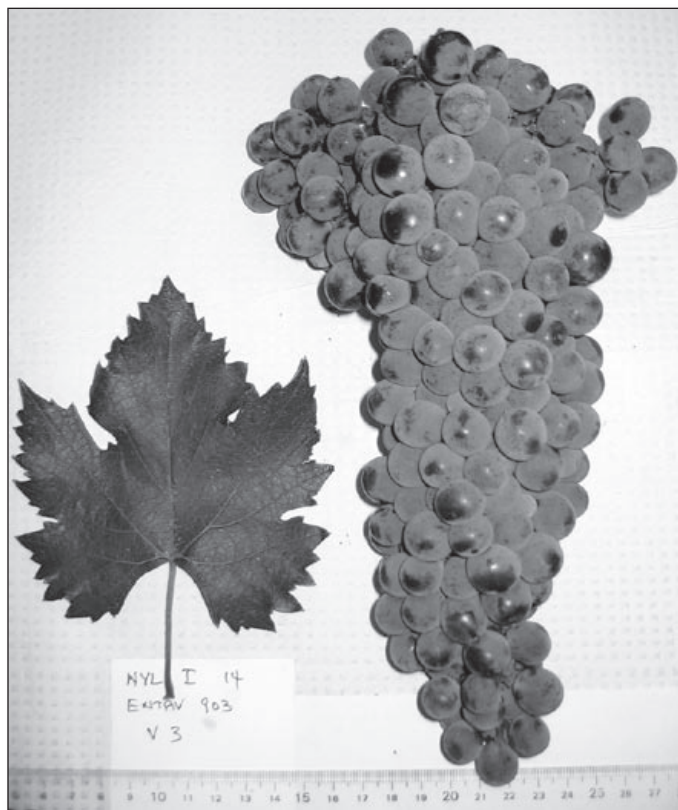
It is anticipated that, in the future, synonyms and biotypes will slowly be replaced by certified clone designations. At present there are over 70 approved clones of Sangiovese in Italy. Most clones have been developed by the universities of Bologna, Firenze-Pisa, Bari, Milano, Milano Banfi srl, and Tuscany, as well as the private nurseries such as Vivai Cooperativi Rauscedo (VCR). In addition, as a result of the extensive research completed during the Chianti Classico 2000 project and the corresponding Brunello di Montalcino project, a number of new certified clones of Sangiovese have been approved (Boselli, et. al., 2004; Mattii, 2006(a)). In the following paragraphs, biotype names have been included in the descriptions of various FPS selections since all available information about source materials could be useful.

At FPS<sup>1</sup> grapes are identified by a variety name and an FPS selection number that corresponds to an original single vine source. Information about the source of vines, such as European clone number and country of origin, is linked to the selection number in the FPS public record. Different FPS selection numbers are also assigned when treatments are used to eliminate known or suspected virus disease. Each treated plant becomes a new single vine source and is assigned a unique FPS selection number. For example, Sangiovese FPS 06 and FPS 20 were both derived from the same single vine source (Italian clone FI-PI-4), but they are considered different selections at FPS because FPS 06 was propagated from the original material without any treatment, whereas microshoot tip culture was used to create FPS 20. Since virus elimination treatments do not usually affect the genotype of a plant, FPS 06 is likely to be genetically identical to FPS 20 even though the two selections have a different health status (FPS 20 tested negative and FPS 06 tested positive for Rupestris stem pitting (RSP)).

<sup>1</sup> In the interest of simplicity, “FPS” is used in this article to identify both grape selections in the current Foundation Plant Services (FPS) grape collection and older selections that were included in the collection when the program was called Foundation Plant Materials Service (FPMS). The name changed from FPMS to FPS in 2003.



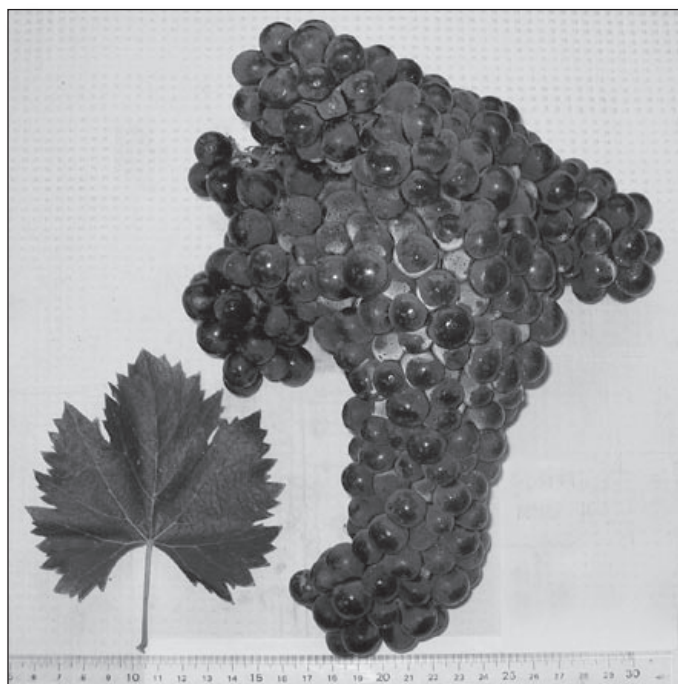
### Sangiovese selections available from Foundation Plant Services



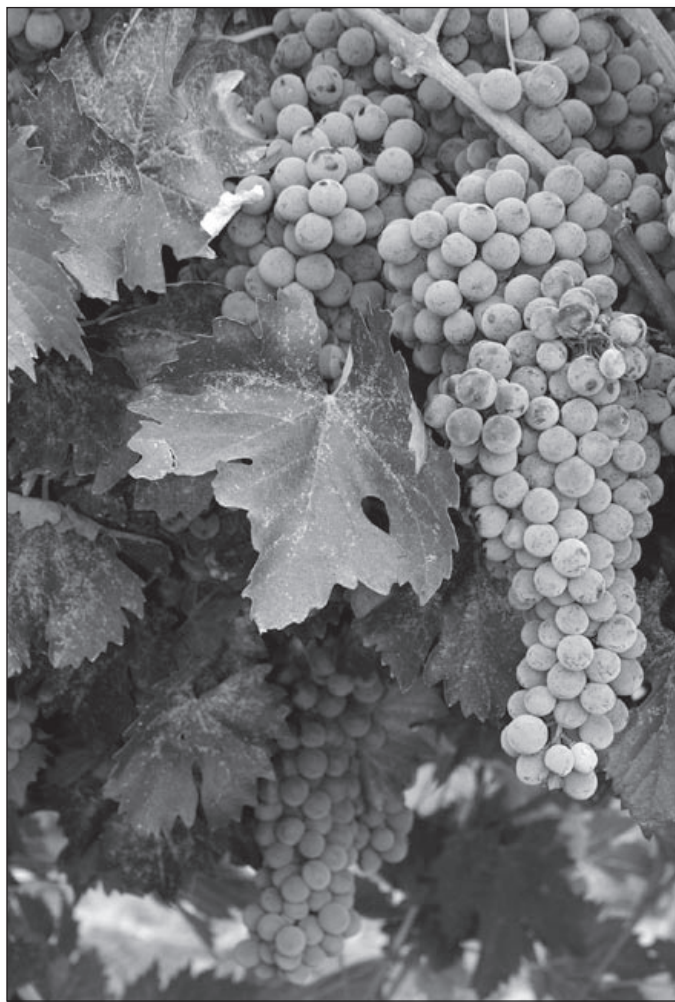
Nielluccio ENTAV-INRA® 903  
photo by JaRue Manning



Sangiovese FPS 20 in the Foundation Vineyard  
photo by Bev Ferguson



Sangiovese FPS 08  
photo by JaRue Manning



Sangiovese FPS 05 from the "Bionde Santi" clone  
photo by Bev Ferguson

Although we know some FPS selections are probably genetically identical to one another, in most cases we do not know which selections are genetically unique clones. Replicated vineyard trials are currently the only way to determine whether selections have phenotypic differences that justify identifying them as unique clones. Some trials of this sort have been conducted by private and public researchers, but horticultural evaluations have never been part of the prescribed process to qualify grape selections for any of the certification programs in the U.S. Since horticultural evaluations are a major component in the French and Italian grape certification programs, they refer to their material as “clones.” European clones, however, do not always perform the same in California as they do in Europe, so horticultural information from European clonal trials may not be applicable to U.S. conditions.

Someday DNA methods currently used to identify grape varieties may become sophisticated enough to routinely distinguish between clones, but the technology is not yet that advanced. Traditional ampelography (visual inspection) does not seem to be a reliable method for identifying specific clones/selections either. Consequently, the only way to know a vine’s clonal/selection identity is to review the records for propagation wood sources.

The oldest Sangiovese selection in the FPS collection was imported from Italy in 1940 by the late Dr. Harold Olmo, professor, UC Davis Department of Viticulture and Enology. According to Darrell Corti, “... Olmo asked Enrico Prati, then working for the Italian Swiss Colony, and who was returning to Italy on a visit, to bring back with him some Sangiovese cuttings. Much to Olmo’s astonishment, Prati returned with two bundles, each with two rooted vines in them.” The selection was planted on the UC Davis campus in a location described as J74 V13. In 1965 USDA-ARS Plant Pathologist Dr. Austin Goheen worked to qualify this selection of Sangiovese for the California Grapevine Registration and Certification (R&C) program. He must have suspected a virus infection because he used heat treatment to clean it up before conducting any disease tests. Two selections from the original material survived heat treatment and became Sangiovese FPS 01 (heat treated 81 days) and FPS 02 (heat treated 145 days).

**Sangiovese FPS 01** was included in the R&C program until about 1970, during the period when Mission was used as the field indicator for leafroll. It was removed in 1985 when it tested positive for leafroll on the field indicator Cabernet Franc, which became the new standard for field leafroll tests in the 1980s.

**Sangiovese FPS 02** was added to the R&C program in 1977. FPS 02 tested negative for leafroll when it was rechecked in 1984 on Cabernet Franc and still remains registered in the R&C program today. The longer heat treatment used to create FPS 02 may be the reason it has always tested negative for virus.

**Sangiovese FPS 03/FPS 24:** In 1973 Goheen imported a selection of Sangiovese that was assigned plant introduction number (PI) 391453. According to the USDA-ARS Plant Inventory, this selection came from F. Scaramuzzi, Direttore dell’Istituto di Coltivazioni Aboree, Università di Firenze, Firenze, Italy. However, Goheen’s records show that the source was Pavia, Italy, which is more than 180 miles northwest of Firenze. The import dates match between the two records, but there is nothing to explain the source disparity. This selection initially tested negative for virus without any heat treatment and was registered in the R&C program for the first time in 1980 as Sangiovese FPS 03. It was dropped from registration in the early 1990s when ELISA tests showed FPS 03 had become infected with leafroll, which was spreading in the old foundation block. A selection designated Sangiovese FPS 24 was recently produced from FPS 03 using microshoot tip tissue culture. FPS 24 tested negative for leafroll and was planted in the current foundation block in 2005. Customers may now order Provisional status mist propagated plants of FPS 24 from FPS.

UC Davis Department of Viticulture and Enology Viticulture Specialist Emeritus Dr. Pete Christensen (1999) reported that FPS 02, 03 and 04 showed distinct clonal differences in a San Joaquin Valley trial. He also said that FPS 02 may be preferred over FPS 03 because it has smaller berries and higher vine fruitfulness and yield. However FPS 02 may require more cluster thinning than FPS 03 to achieve vine balance.

**Sangiovese FPS 04:** Goheen arranged to import a public selection of Sangiovese from Vivai Cooperativi Rauscedo (VCR) in Italy in 1983. VCR is a private nursery cooperative that was formed 70 years ago and which currently has an annual production capacity of over 45 million vines. More than 30 years ago, VCR started its own clonal selection program which includes microvinification for evaluating winegrape clones. The clone VCR sent to Goheen in 1983 was designated “Rauscedo 10 (Grosso Lamole).” The original material tested negative for virus so it was registered in about 1992. However it was placed on “hold” in 1999 because Christensen (1999) reported that in a San Joaquin Valley clonal trial “Clone 4 [FPS 04] was generally undesirable as compared to the others [FPS 02 & 03]. It had the poorest fruit composition, with significantly lower titratable acidity and higher pH,

and the greatest incidence of bunch rot. It was also lowest yielding.” Selections on “hold” at FPS are still in the foundation block and remain registered in the R&C program, but customers are informed about the problems that triggered the “hold” status before they purchase the materials. In the case, growers may find areas outside of the San Joaquin Valley where Sangiovese FPS 04 would perform well.

In 1995 Alberto Antonini sent FPS three Sangiovese clones from Italy for the Robert Mondavi Winery. These clones (FI-PI-4, FI-PI-172, and B-BS-11) were selected at the University of Florence and Pisa. Upon release from quarantine, propagation materials were provided exclusively to Mondavi. After two years the winery generously allowed FPS to change the status of all three clones to “public” so they could be distributed without restriction. Special thanks to Rupert Mathieu for his help with the translation of the three following Sangiovese clone descriptions that appeared in the Italian trade journal *Vignevini*, December 12, 1994—the descriptions are included below with their associated FPS selection numbers.

**Sangiovese FPS 06 and FPS 20** were both derived from the same 1995 introduction of FI-PI-4. The original material tested positive for RSP, but since RSP is not one of the diseases prohibited by U.S. federal or California state quarantine regulations, it was released from quarantine in 1999 without any treatment. RSP was dropped from the California Grapevine Registration and Certification (R&C) program requirements on January 1, 2001, so the original material was registered in 2001 and designated Sangiovese FPS 06. Another selection, created from the original FI-PI-4 material using microshoot tip tissue culture, tested negative for RSP. It is designated Sangiovese FPS 20 in the FPS collection and was registered in the R&C program in 2005. The Sangiovese FI-PI-4 clone is a Grosso Montalcino biotype. The vine has medium vigor and good fertility. The clusters are small and loose with a pyramidal shape and one wing. The berries are small with an oblate shape, blue-violet color, and have good tolerance to botrytis. The wine is deep red with a vinous aroma. It is spicy, alcoholic when young and suitable for quality wine with a moderate period of aging.

**Sangiovese FPS 19:** The original FI-PA-172 material imported in 1995 tested positive for RSP and Grapevine fleck virus, which is of quarantine concern. Tissue culture was used to eliminate fleck and RSP and create a selection designated Sangiovese FPS 19. FPS 19 was released from quarantine in 2003 and registered in the R&C program in 2005. The FI-PA-172 clone is a Grosso Lamole biotype with good vigor, medium-high produc-

tivity, moderate fertility and top quality. The clusters are extended with one wing, small, fairly compact, and pyramidal. The berries are medium, blue-violet, ovoid, and tolerant of botrytis. The wine is intense ruby red with a vinous aroma, alcoholic, sapid with a full body, suitable for wines destined for moderate to long aging.

**Sangiovese FPS 12:** The original B-BS-11 material imported in 1995 was infected with leafroll, fleck, and RSP. Sangiovese FPS 12 was created from the original material using tissue culture, which successfully eliminated the viruses. FPS 12 was released from quarantine in 2001 and registered in the R&C program in 2003. The original B-BS-11 clone is a Grosso Montalcino biotype that is reported to have good vigor, moderate and consistent production, above average fertility. The clusters are small, extended compact with one wing. Berries are of medium consistent size, ovoid with a uniform blue color with good botrytis tolerance. The wine is ruby red, with a vinous aroma, delicate, alcoholic, sapid and with sustained acidity and reasonable body, suitable for aging.

In 1996 six Sangiovese clones (and one likely to be a Sagrantino clone) were collected for FPS from the Robert Pepi Winery in Oakville, California, thanks to the efforts of Greg La Follette and the generosity of Kendall-Jackson Vineyards and Winery, owners of the Pepi Winery at the time. La Follette invited Dr. Anna Schneider, ampelographer from the Centro di Studi per il Miglioramento Genetico della Vite, CNR, Torino, Italy to visit in May 1996. She inspected a collection of Sangiovese clones assembled by Robert Pepi and planted in a clonal trial next to the Pepi Winery. She also selected ‘true to variety’ source vines for each of the clones for the FPS collection.

Assorted viruses (leafroll, fanleaf and/or RSP) were detected at FPS in all seven of the selections from the Pepi vineyard. Microshoot tip tissue culture was used to eliminate the virus and create selections qualified for foundation stock status for all seven of the original clones. The virus-tested selections are now identified with FPS selection numbers shown below along with their original Pepi clone designations and a few horticultural observations made by Greg La Follette.

**Sangiovese FPS 05 and FPS 14** were made from the Pepi vineyard “Bionde Santi” clone of Sangiovese Grosso (Brunello). Robert L. Pepi (2006) said, in a recent personal email, “We were told back in 1983, by the nurseryman in Italy who procured the cuttings for us, that indeed the clone we received was the Bionde Santi clone.” Bionde Santi is the clone used in Brunelle di Montalcino to make a wine called Brunello. La Follette said this clone has lower vigor than the other six in the Pepi Winery trial. FPS 05 was obtained from the original

Pepi Bionde Santi material without any virus elimination treatment since it tested positive only for RSP. FPS 05 was registered in 2001. Tissue culture was used to make FPS 14 from FPS 05. FPS 14 tests negative for RSP and was registered in 2003.

**Sangiovese FPS 15:** The “Atlas Peak” or “Dr. Peterson” clone was selected for the Pepi Winery by Dick Peterson from the Atlas Peak Antinori selection. La Follette says that it flowers very early and has large clusters with big wings and long rachis. The petiolar sinus is very large. Sangiovese FPS 15 was made from this source using microshoot tip tissue culture and registered in 2003.

**Sangiovese FPS 22:** During her 1996 vineyard inspection, Schnieder reported that the Pepi vineyard “Crown clone” vines were not Sangiovese. She thought they could be Sagrantino, although a positive identification could not be made. Pepi reported that the Italian nurseryman who provided the cuttings said that a few of the cuttings were Sagrantino. DNA tests on Sangiovese FPS 22, derived from the Crown clone, do not match Sangiovese or any other cultivar in the FPS DNA profile database. FPS 22 is currently on “hold” until the vines can be professionally identified either by an expert who can recognize the variety or through a DNA match.

**Sangiovese FPS 23:** Sangiovese FPS 23 was derived from the Pepi “Bob Jr.” clone and planted in the FPS foundation block in 2005. Pepi said he does not know this clone, so the origin of the name is unclear. La Follette reported that this clone flowers late and is extremely fertile with many small size clusters. FPS 23 will have Provisional registration status until it fruits and is professionally identified.

**Sangiovese FPS 17:** One Pepi clone was labeled “Oakville Station,” possibly indicating that the clone was derived from material at the UC Davis Department of Viticulture and Enology Oakville field station. However we could find no record of Sangiovese being planted at the field station, so the source is uncertain. La Follette reported that this clone had the lowest yield of the trial, generally had just one wing per cluster (other clones often have two), produced small bunches and had low vegetative vigor. Sangiovese FPS 17 was derived from this selection which was registered in the R&C program in 2003.

**Sangiovese FPS 26:** La Follette notes that the “Alexander Valley Estancia” clone at Pepi is “very distinctive.” It has closed petiolar sinus, very small clusters and very weak habit showing some Eutypa. At FPS it tested positive for leafroll, fanleaf and RSP. Sangiovese FPS 26 was derived from this clone using microshoot tip tissue cul-

ture and planted in the foundation block in 2006. It will have Provisional registration status until it is professionally identified.

**Sangiovese FPS 21:** The “Rutherford/Saint Helena” or “Rutherford Franciscan” clone from the Pepi vineyard has very vigorous vegetation and large clusters, but not as large as the Atlas Peak/Dr. Peterson clone according to La Follette. It tested positive for leafroll, fanleaf and RSP at FPS. Sangiovese FPS 21, which was derived from this clone, was registered in 2004.

**Nielluccio ENTAV INRA ® 903:** In 1997 the ‘Etablissement National Technique pour l’Amelioration de la Viticulture’ (ENTAV) contracted with FPS to import a clone of Sangiovese for production in the U.S. ENTAV maintains the French national repository of accredited clones and has created an ENTAV-INRA® Authorized Clone trademark to identify its official clonal materials internationally. Trademarked importations come directly from official French source vines and all the propagation work and records are checked by the most authoritative French experts. ENTAV retains the exclusive rights to control the distribution and propagation of its trademarked materials, which are only available to the public from nurseries licensed by ENTAV (California Grapevine Nursery, Herrick Grapevines, Mercier Grapevines and Sunridge Nurseries). The Sangiovese clone sent by ENTAV was labeled Nielluccio, which is the name Sangiovese is known by on Corsica. Based on DNA analysis, Calo et. al., (2004) reported that Nielluccio should be considered one of the biotypes of Sangiovese as well as a synonym. Since privately owned clones are identified at FPS with the names chosen by the owners, this clone is designated Nielluccio ENTAV-INRA® 903. It was registered in the California R&C program in 2000.

In 1997 VCR formed a joint venture with NovaVine Grapevine Nursery in Santa Rosa, California making NovaVine the exclusive U.S. producer and distributor of privately-controlled VCR clones. As part of this project, VCR sent six private Sangiovese clones to FPS over a period of three years (1998-2000). All six clones qualified to be released from quarantine without any virus elimination treatments. The VCR sources and associated FPS selection numbers are shown below along with information about biotype designations, horticultural characteristics, and enological descriptions from Michael Jones, VCR, NovaVine, *Vitigni d’Italia*, *Catalogo dei Cloni*, and the Italian journal *Vignevini*.

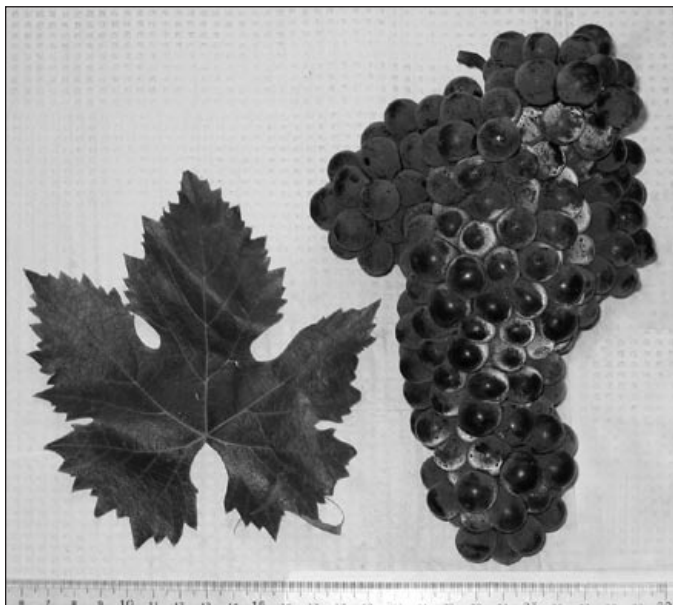
**Sangiovese FPS 07** (registered in CA 2002) is from VCR 6 (Montalcino). VCR 6 is a clone of the Montalcino biotype, which is the biotype traditionally used to produce

Brunello di Montalcino wine. It has good vigor, medium productivity, good general and basal fertility, and medium-small clusters that are moderately compact. Berries are medium-small, dark blue with good botrytis resistance. The wine is rich in color, perfumed and spicy, with plum and cherry scents, robust, and improves with aging. VCR 6 and VCR 23 were the preferred stand-alone clones in microvinification tastings.

**Sangiovese FPS 08** (registered CA in 2002) is from VCR 19 (Romagnolo). The vine is vigorous with medium productivity and good basal fertility. It is adapted to hilly terrain, heavy soils. The clusters are medium, semi-compact with one wing. The berries are medium-small, thick-skinned and resistant to botrytis. The wine has good color, intensity, and floral/spicy aromas. It is adapted for moderate aging and blending. This clone originally came from Emilia-Romagna.

**Sangiovese FPS 10** (registered in CA in 2001) is from VCR 23 (Romagnolo). The vine has good vigor, medium productivity, medium general and basal fertility. The clusters are medium-small, cylindrical, and semi-compact. The berries are smaller than average and blue-black in color with good botrytis resistance. The wine is light ruby red with the spicy aroma of cinnamon and black pepper. It has good body and good polyphenols. It is adapted for long aging and/or blending. This clone originally came from Emilia-Romagna.

**Sangiovese FPS 09** (registered in CA in 2002) is from VCR 30 (Lamole). The vine has medium vigor and production with good general and basal fertility. The clusters are medium cylindrical and semi-compact. The



**Sangiovese FPS 13.** Photo by JaRue Manning



**Sangiovese FPS 18.** Photo by JaRue Manning

berries are medium dark blue and resistant to botrytis. The wine is fruity, and spicy with good color and structure. This clone is adapted for Chianti blends and the wine acquires finesse with aging.

**Sangiovese FPS 13** (registered in CA in 2004) is from VCR 102 (Prugnolo). The vine has lower than normal vigor and production capacity. It has medium fertility, good basal fertility. The clusters are medium-small and semi-compact. The berries are medium size and blue-black in color with good botrytis resistance. The wine has intense ruby red color, spicy nose and good structure. It is tannic and full bodied. It is adapted for blending with wines destined for long aging. This clone originally came from Tuscany. Prugnolo is the name for the biotype of Sangiovese grown in the Montepulciano region, and is used to produce “Vino Nobile de Montepulciano.”

**Sangiovese FPS 18** (registered in CA in 2004) is from VCR 221. The clonal evaluation process was not completed for Sangiovese 221 in Italy, so no description is available at this time.

In total, FPS has 20 Sangiovese selections in the collection in 2006. Of these, seven are privately owned and controlled, while the remaining 13 are available for distribution from FPS without restriction. All of the Sangiovese selections are shown in Figure 1 with registration status and availability noted. Many of the selections of Sangiovese available from FPS and private nurseries have

**Summary of the Sangiovese selections, availability and their source and disease test status.**

FPS sel #	Reported Source	Reg Status	Available from FPS	Disease test status	Treatment
01	from Italy by Enrico Prati in 1940	registered 1970-1985 currently non-reg	no	leafroll+	heat treated 81 days
02	from Italy by Enrico Prati in 1940	registered 1977	yes	all tests negative	heat treated 145 days
03	PI #391453 from Italy in 1973	registered 1980-1992 currently non-reg	no	leafroll+	none
24	PI #391453 from Italy in 1974, from FPS 03	provisional 2005	yes	all tests negative	shoot tip culture
04	Rauscedo 10 from Italy 1983	registered 1997	yes HOLD	all tests negative	none
06	Italian clone FI-PI-4 from Italy in 1995	registered 2001	yes	RSP+	none
20	Italian clone FI-PI-4 from Italy in 1995	registered 2005	yes	all tests negative	shoot tip culture
19	Italian clone FI-PA-172 from Italy in 1995	registered 2005	yes	all tests negative	shoot tip culture
12	Italian clone B-BS-11 from Italy in 1995	registered 2003	yes	all tests negative	shoot tip culture
15	Atlas Peak clone from Pepi Winery in 1996	registered 2003	yes	all tests negative	shoot tip culture
05	Bionde Santi clone from Pepi Winery in 1996	registered 2001	yes	RSP+	none
14	Bionde Santi clone from Pepi Winery in 1996	registered 2003	yes	all tests negative	shoot tip culture
23	Bob Jr clone from Pepi Winery in 1996	provisional 2005	yes	all tests negative	shoot tip culture
22	Crown clone from Pepi Winery in 1996 (ID probably = Sagrantino)	provisional 2001	yes HOLD	all tests negative on hold because of mis ID	shoot tip culture
26	Alexander Valley Estancia clone from Pepi Winery in 1996	provisional 2006	fall 2006	all tests negative	shoot tip culture
17	Oakville Station clone from Pepi Winery in 1996	registered 2003	yes	all tests negative	shoot tip culture
21	Rutherford/St. Helena clone from Pepi Winery in 1996	registered 2004	yes	all tests negative	shoot tip culture
07	VCR 6, from Italy in 1998	registered 2002	contact Novavine	RSP+	none
08	VCR 19, from Italy in 1998	registered 2002	contact Novavine	RSP+	none
09	VCR 30, from Italy in 1998	registered 2002	contact Novavine	RSP+	none
10	VCR 23, from Italy in 1998	registered 2001	contact Novavine	RSP+	none
13	VCR 102, from Italy in 1999	registered 2004	contact Novavine	all tests negative	none
18	VCR 221, from Italy in 2000	registered 2004	contact Novavine	RSP+	none
Nielluccio 903	ENTAV INRA ® 903 Authorized Clone from ENTAVFrance in 1997	registered 2000	contact Sunridge	all tests to qualify for foundation stock negative	none

already been evaluated in Italy or France, but are just now becoming registered in the California R&C program. It will be interesting to see how they perform in future California vintages.

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### Acknowledgements:

Special thanks to the following who contributed information used in this article:

**Maurizio Boselli**, Professor of Viticulture, Università degli Studi di Firenze, Italy

**Anna Schneider**, Centro di Studi per il Miglioramento Genetico della Vite, Torino, Italy

**Michael Jones**, Export Director, Pepper Tree Wines

**Greg La Follette**, owner and winemaker for Tandem Winery Sebastopol, California

**Tom Nemcik**, Operations Manager, NovaVine Grapevine Nursery

**Giovanni Mattii**, Professor, Università degli Studi di Firenze, Italy

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# Jackson Vineyard Story

By Dr. Austin Goheen, emeritus USDA, ARS Plant Pathologist, with an introduction by Susan Nelson-Kluk

If you take the time to scan the “Foundation Plant Services Registered Grape Selections” you will notice that “Jackson, CA” is shown as the source for 29 of the registered selections (Table 1). The story of this vineyard from a letter written by Dr. Austin Goheen in the 1980s is published here for the first time.

Dr. Austin Goheen was a USDA, ARS Plant Pathologist assigned to the UC Davis campus to work on grape virus diseases from 1956 to 1986. He was one of handful of scientists who held a federal permit for importing grapes into the U.S., and so facilitated legal importation of many foreign grape selections during his tenure. For 30 years he conducted all the virus tests and virus elimination treatments (heat treatment) used to qualify foreign and domestic grape materials for Foundation status in the California Grapevine Registration and Certification (R&C) program as part of his USDA research program. He also served as a technical advisor to Foundation Plant Materials Service (FPMS), now known as Foundation Plant Services (FPS). His work resulted in a collection of hundreds of registered mother vines documented with meticulous records of tests and treatments used to evaluate them. These materials and records still form the backbone of the grapevine clean stock program at FPS.

One of the early projects Goheen worked on with Dr. Curtis Alley of the UC Davis Viticulture and Enology Department, was locating grape materials in old vineyards. They theorized that the use of phylloxera resistant rootstocks may have contributed to the spread of grape viruses. If their theory was true then vines planted on their own roots before rootstocks were used would be more likely to be free of

virus. When the Jackson Vineyard was found in Amador County, Goheen saw it as a way to test out this theory and collect more varieties for the California R&C program. Below is a letter Goheen sent to Mrs. Susan French on December 9, 1982 about the Jackson vineyard to help her write a history of Sauvignon blanc/Fume blanc for the Robert Mondavi Winery.

“Dear Ms. French:

I am sending you copies of some of the notes and records that I have gathered concerning the Foothill Experiment Station of the University of California. I have especially selected those that mention Sauvignon blanc. The station and my involvement in its history make an interesting story.

During the early 1960’s one of my objectives was to find healthy plants of California cultivars. Many commercial plantings were badly affected by virus diseases when I arrived in California in 1956. Along with Professor Hewitt and Dr. Curtiss Alley we identified the diseases present and sought out sources of healthy materials. An early lead came in 1961 from the owner of a small plot of Mission grapes in the town of West Point, California, by the name of C.T. Smith. Mr. Smith’s vines were free from leafroll, which was unusual when we compared the health of these vines with totally leafroll-affected vines in many other locations in California.

Upon checking closely with Mr. Smith, we learned that his vines came from a mysterious planting in the woods of Amador County. This planting appeared to have been a variety collection, which had been abandoned shortly after the turn of the century, but Mr. Smith was not

**Table 1.**  
**FPS Varieties/Selections sourced from the Jackson Vineyard**

Aramon – 02
Bonarda – 02
Cabernet Sauvignon – 06
Cinsaut – 03
Freisa – 01
Freisa – 03
Grenache noir – 03
Lagrein – 03
Mission – 11
Mission – 13
Mondeuse – 01
Negrette – 04
Petit Verdot – 02
Peverella – 04
Pinot gris – 01
Pinot noir – 09
Pinot noir – 16
Pinot noir – 106
Riesling Italico – 04
Sauvignon blanc – 29
Tinta Amarella – 01
Tinto Cao – 03, 04, 05, 04
Traminer – 01
Trousseau – 08, 09
Valdepenas – 03

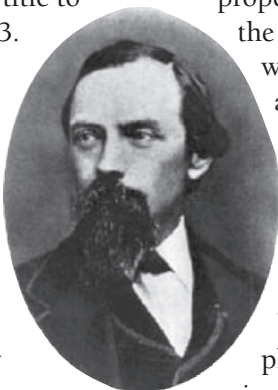
sure whether any vines still existed there. If they did, he was not sure of the origins of the planting.

I next checked with Mr. Lee Brown, Agricultural Commissioner, and Mr. Bob Plaister, Farm Advisor, Amador County. Both were very helpful, especially Mr. Plaister. I learned from him that the planting was an abandoned Experiment Station of the University of California, and the owner in 1963 was a Mr. Fantozzi, who was a stone mason in Jackson, California. Plaister introduced me to Mr. Fantozzi, who was very suspicious of my motives when he learned that I was associated with the University of California.



The reason for the suspicion was not apparent to me at first because my intent was purely to check whether any vines might still be alive in the mystery plot. The story unfolded that Mr. Fantozzi had inherited the land upon which the vines had been grown from his parents, who in turn had obtained title to the land through squatter's rights. The site had indeed been an experiment station of the University. The University had held title to it from about 1889 until November 1, 1903.

In the 1880's the University established seven experimental grape vineyards around California under the guidance of Professor Hilgard. Professor Hilgard is probably the first scientific viticulturists in California, and he may well be the first viticulturist anywhere in the world, who held a scientific interest in comparing cultivars in a systematic way. One of the early test plantings was in Berkeley, another was at Cupertino, a third was near Paso Robles, and a fourth was the Foothill Experiment Station near Jackson. I did not locate the other three plantings, and I was never able to find the station at Paso Robles.



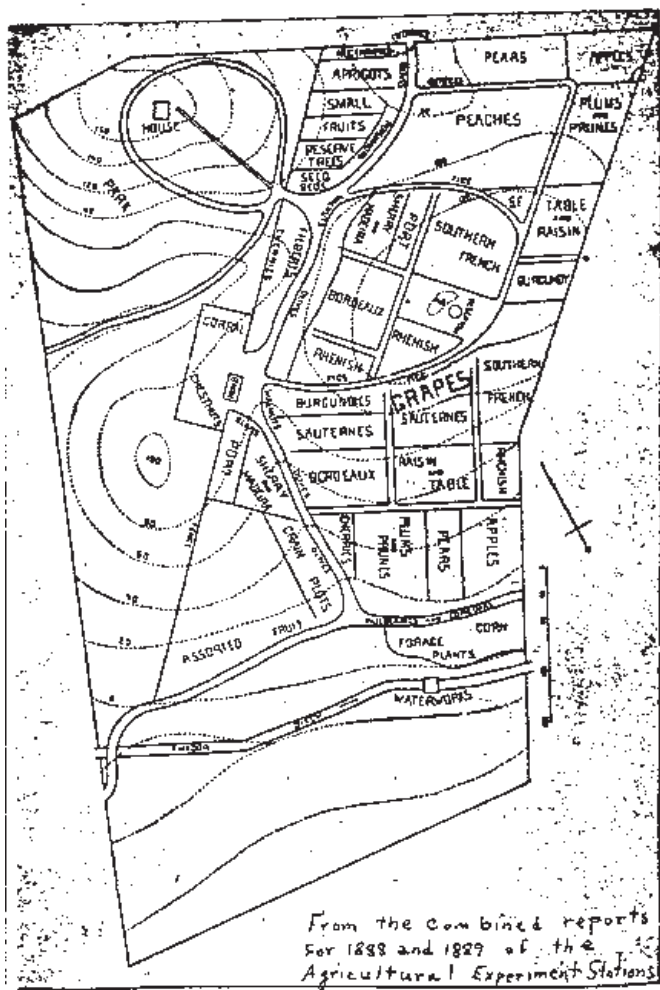
Hilgard

Professor Hilgard was apparently a successful grantsman and his efforts were supported by members of the California legislature. I do not have the details of the early financial records of the main experiment station, but I did research the Foothill Experiment Station. It seems that this station was established to test the feasibility of grape production in the foothills area when the Placer mines were beginning to play out and the argonauts were turning from mining to farming. Professor Hilgard appreciated the changing times and brought the need to know farming potential to the attention of the legislature. Two state senators, a Mr. A. Cominetti and a Mr. John Roggs along with a Mr. McKay and a Mr. Trabucco, donated land to the University for a test planting near Jackson.

This land belonged to the University as long as it was used for scientific experiments. If the University did not keep it up, the land would revert to the heirs of the donors. Hilgard obtained operating funds, hired a station superintendent, and planned facilities for the station. Grapes along with other fruit crops were first planted in 1889. The plants grew and the observations obtained by the station personnel were published in the annual reports of the California Agricultural Experiment Station from time to time. It became apparent, however, that the foothills of Jackson were less desirable for agricultural crops than the land on the valley floor nearer to Lodi and Stockton. The station was consequently abandoned in 1903.

The station with its crops and buildings stood idle for a space and at some point the Fantozzi family moved into the empty buildings and made some sort of living from the old farm. They were eventually awarded title to the property. In the meantime the heirs of the original donors became aware that the University had abandoned the station and they instituted a claim against the property. A legal battle developed, pitting the heirs and the University against the Fantozzis. The Fantozzis won their claim and in their eyes the University was among the "bad guys".

The legal battle was not the only action that the donors' heirs resorted to. In a vindictive action someone raided the property and burned the buildings. These marauders did not destroy the trees or vines but the Fantozzis were forced to leave the property and move into Jackson. The plants were abandoned as far as cultivation or irrigation and the native vegetation of the foothills area gradually encroached to reclaim the land. Bushes and



Map of the Foothill Experiment Station at Jackson, Amador County, from the combined reports for 1888 and 1889 of the Agricultural Experiment Stations.

trees grew at random among the vines and fruit plants, but the outlines of the vine rows, the roads, the reservoir, and foundation of the buildings remained.

By the early 1960's one would really have to know the history of the place to make much sense of it. It was like many abandoned homesteads in the back country of California where the local family could not make a successful living, resulting in a move to town where jobs were more readily available. At this point when I found the Fantozzi heirs and requested permission to visit the site, I was greeted with considerable hostility. As soon as Mr. Fantozzi learned that I was associated with the University he bristled.

At this juncture I thought I would not be able to visit the old site. Mr. Brown, the Agricultural Commissioner, interceded with Mr. Fantozzi and finally convinced him that I had no design on the property, that I was not going to renew the vendetta, and that my interest was purely scientific. I was permitted to visit the place where I found the outlines of the rather elaborately set-out plots. I even found numerous vines still growing in spite of the fact that deer had browsed them for almost 60 years.

On my first visit in March 1963, I mapped one of the areas where vines were still rather neatly growing in rows, and I obtained cuttings from a number of them. These I brought back to Davis where I propagated them. I also began to search the old experiment station reports in the Davis library. In these I found several references to the Foothill Station and I even found a map of the station plan, which had been published in the 1890 report.



Dr. Goheen (left) is shown checking grapevines with Susan Nelson-Kluk in the mid-1980s.

The 1889 report gave a list of grape cultivars planted or planned to be planted for all seven of the University grape trials. You will see that Sauvignon blanc was one of the cultivars listed as a Sauterne Type for inclusion in the tests.

I could not believe that the records of the Foothill Station had been abandoned and destroyed along with the buildings at the site. I therefore checked with the archives of the main University library in Berkeley and found that the record of plantings at the Foothill Experiment Station were preserved and still available for study. I visited the Berkeley library and poured over these old records. I made copies of the planting plans, which I still have [see figure #1—map of vineyard from Berkley library via Goheen's files]. I would sometime like to return to the library and make a photocopy of the record book, but I have never had time for this latter project.

I was able to reconstruct the row by row planting scheme of the old station and identify the blocks by comparing with the plan published in the annual reports and individual vines from their relative position. Some of the blocks were so well preserved that this was no problem. The vines that I have gathered in 1963 were without doubt the same as the vines that were set during the period 1889 to 1892. This was not as easy to do for other blocks where the forest encroachment had been more aggressive. One of the later type of planting was Block S, which contained 10 vines of Sauvignon blanc in row 15.

I did locate the periphery of Block S, and on a subsequent visit to the site I collected as many vines as I was able. In what I thought was row 18 of Block S, I collected a vine, which the records indicated should be Herbe-mont. Herbe-mont is an American bunch grape of Professor Munson, an early grape breeder from Texas. The grape that I obtained turned out to be Sauvignon blanc. My collection was apparently three rows off from the original plan, an easy mistake when one considers the abandoned state of the planting at the time of my visit.

All together, my assistant, Mr. Carl Luhn, and I identified 132 grape cultivars still growing in the old station. We obtained cuttings from a good number of these. We tested these for diseases and found that in general these were markedly free from viruses. I interpret this to mean that the cuttings used in propagating Hilgard's vineyards came to California at a date before viruses became so widespread as they appear to be in modern European vineyards.

The Foothill Experiment Station record book indicates that Sauvignon blanc was planted at the site in February 1890. I am sure the cultivar was called by that name at that time. The planting stocks were cuttings that came from Berkeley. Hilgard must have had vines at Berkeley with sufficient age to obtain cuttings, or he may have imported the cuttings directly from France and carried them to Jackson and the station. The record does not show this fact, so I would imagine that mature vines of Sauvignon blanc were growing somewhere in Berkeley in 1889.


Sauvignon blanc appears in the Foothill Experiment Station records from time to time, but it was not recognized as a superior cultivar. The sophistication of the early viticulturists was probably not very high. In 1895 the station reported promise from Burger, Follo blanche, and several others for producing dry white wines, but the author made no mention of either Sauvignon blanc or Chardonnay. The latter appears on the list of cultivars planted in the early stations but we did not locate Chardonnay among the samples that we collected from Jackson.

I have copied only those records from the Foothill Station that might bear on Sauvignon blanc. In these copies I have highlighted some of the important reference items. I have also tried to include any mention of Sauvignon blanc that might have been made. I have highlighted these references also.

Sincerely yours,

A.C. Goheen

Research Plant Pathologist”

*In December 1970, Goheen and his assistant Carl Luhn published an article in the Plant Disease Reporter entitled “Viruses in Early California Grapevines.” They reported that leafroll virus was present in 20 out of the 110 (18%) Jackson Vineyard vines that were tested. Fanleaf and other viruses were completely absent. They compared this to the 80 to 100% of leafroll infection they were finding, at the time, in commercial vineyards and concluded that rootstocks were contributing to the spread. We know now that mealy bugs are also responsible for spreading leafroll. We are grateful for all the work Goheen did to rescue the Jackson selections and tell the story. *

# 'Variety Focus: Grapes of the Rhône' Course Offered Opinions and Wine Tastings

by Beverly Ferguson, Media Coordinator, Foundation Plant Services

ATTENDEES TO THE UC DAVIS EXTENSION COURSE, "Variety Focus: Grapes of the Rhône," enjoyed talks by international winemakers and sampled Rhône and Rhône-style wines on May 25, 2006. FPS Director Deborah Golino opened the session, explaining that the roots of the course began in 1994 when the ASEV Clonal Symposium introduced the concepts of clones.

Remington Norman, a former Master of Wine and the author of *Rhône Renaissance: the Finest Rhône and Rhône Style Wines from France and the New World* shared his insights on the interest in Rhône varieties and marketing opportunities, terroir, blends and wine styles.

Deborah Golino's presentation "Rhône Varietals and Clones: Coming Soon to a Location Near You" outlined the terms 'clone,' 'cultivar,' 'varietal,' and 'selection' and gave a brief overview of the FPS and French clean stock programs. Her focus, however, quickly shifted to the selections at FPS from the Rhône region of France. Eight Château de Beaucastel selections, imported by Tablas Creek Vineyard in 2004, are currently in quarantine and undergoing tissue culture, and will be added to the public collection three years after they are released from quarantine. These include selections of Bourboulenc, Cinsaut, Clairette blanc, Muscardin, Picardin, Picpoul blanc, Terret noir and Vaccarese. The Morisoli Heritage Vineyard donated Durif 7236 and a Syrah in 2002 which will become available when they are registered. Six selections of Durif and Peloursin donated by Stags' Leap Winery in 2004 are currently nonregistered, and will be publicly available upon becoming registered. [These have since been released, and will be available as Provisional stock beginning fall 2006, as Durif FPS 04, Peloursin FPS 01 and Syrah FPS 15.] Selections of Durif 7068, Peloursin and Syrah from an old vineyard by the St. Helena Library were donated to FPS in 2001 will likewise become available in the public collection upon achieving registered status. Golino discussed additional Rhône varieties currently in the FPS collection.


Françoise Perrin, whose family has owned Château de Beaucastel in the southern Rhône Valley for five generations, spoke about the Châteauneuf-du-Pape varieties at Château de Beaucastel. The land is noted for its large stones laid down centuries earlier by the Rhône River, and for the historical diversity of vines as they evolved to local conditions. He described how the varieties could be categorized for the properties they bring to wines, and optimum ranges of proportions for using them in blends.

Perrin's talk was accompanied by wine tastings of both his varieties and blends.

Glenn McGourty, UC Cooperative Extension viticulture and plant science advisor for Lake and Mendocino Counties, discussed his clonal evaluations of Rhône winegrape cultivars. He has done extensive work evaluating viticultural attributes and performance of Syrah, Grenache, Mourvedre, Cinsaut, Viognier and Marsanne in a series of clonal trials in Mendocino and Lake County. Wine chemistry was evaluated in some, although there is limited tasting information.

In his talk entitled "Syrah (Shiraz) Down Under - The SAVII Vine Selection Program," Wayne Farquhar spoke about the South Australia Vine Improvement Inc. (SAVII) selection work with Shiraz. Farquhar is the executive officer for SAVII, and in addition to overseeing the clean stock program, does clonal evaluations and winemaking. Berry assessments, color and flavor characteristics were described for Shiraz 1654 (the industry benchmark in South Australia) and three other clones: SAVII 13, 17 and 19. He found that the adage that a smaller berry equals highest color did not hold true; that SAVII 19 had both a larger berry and the highest total pigment and highest density, and was consistently ranked by winemakers as most preferred. The SAVII 17 clone was a close runner-up. [An article by Farquhar giving further details of his work can be found on page 6.]

In "A Rosé by Any Other Name," John Buechsenstein, a Rhône Ranger, wine lecturer, and winemaker for Sauvignon Republic Cellars in Santa Rosa, spoke about the qualities and future of rosé wines. He brought extensive details about vinification schemes for the production of rosés with Rhône varieties, and discussed *pressurage direct* and *la saignée partielle de la cuve* methods of vinification in Tavel. Six rosé wines were sampled and discussed.

Robert Haas, general partner for Tablas Creek Vineyard, Paso Robles, concluded the session with a talk and tasting of wines featuring Rhône varieties. Mr. Haas has been in the wine business since 1950, and partnered with the Perrin family to start Tablas Creek Vineyard in 1990, selecting sites in California with similar soils to Château de Beaucastel, where planting material has been imported from since 1990. He noted that the restrictive system in France has actually protected the diversity of grape varieties, and he would like to broaden the spectrum of varieties grown in California. A tasting of Tablas Creek blends followed, peppered with his observations and experiences. 

# Revising Regulations for the CDFA Grapevine Registration and Certification Program

by Susan Nelson-Kluk, FPS Grape Program Manager

GRAPEVINE CERTIFICATION SCHEMES WORLDWIDE share a common goal of providing standard procedures to produce grape nursery stock that tests free from select graft-transmissible diseases. The actual procedures and protocols vary widely depending upon the target diseases, the diseases endemic to the production region, the technical and financial resources available and the expectations of the industry served by the program.

The quality and reliability of any certification scheme is dependant upon the techniques used for detection of pathogens. Technology for the detection of grapevine viruses and other graft-transmissible pathogens has undergone rapid development in the last decade. Progress in this area has been enormous; in contrast, regulatory programs for certification and registration of plant materials have been historically slow to change. New technology is often not included in regulations and formal certifications schemes until many years after it is developed.

The California Grapevine Registration and Certification (R&C) program is administrated by the California Department of Food and Agriculture (CDFA), and is currently being reviewed and revised to incorporate new science and best practices available for excluding disease from certified grape planting stock. A series of meeting were held on October 15, 2005, January 13, 2006, February 22, 2006, and April 26, 2006 to discuss updating the regulations which govern the program. The meetings were attended by California grape nursery representatives, CDFA staff, grape growers, winemakers, University scientists, Foundation Plant Service (FPS) staff, farm advisors, California Association of Winegrape Growers (CAWG) representatives, and county agricultural commissioners.

R&C program participants, CDFA and FPS have agreed for some time that the current regulations (adopted in 1984) need to be revised. A proposed revision dated August 14, 1997 was written in the mid 1990s, but it was not carried through the seven month long review and adoption process. The current effort was started in the fall of 2005 because up-to-date regulations will be needed to serve as a model for the newly formed National Clean Plant Network. In addition, it might be necessary to create a national or at least a regional mandatory grape certification program to retain some of the current quarantine protection for grapes if the USDA, Animal and Plant Health Inspection Service (APHIS) proceeds with a scheduled review of the Q37 federal quarantine regulations for grapes.

The work so far has focused on making the new regulations scientifically sound and flexible enough to recognize


new technology as it comes along, while maintaining the strength of the program; making the R&C program accessible to all businesses producing grape nursery stock; and providing a system for phasing out grape nursery stock over time when it does not meet the best available standards. In addition, changes to the regulations governing increase block isolation, documentation, top working, secondary increase blocks, virus testing protocols, biotic contaminants, insect virus vector control, and scheduling regular regulations reviews in the future were considered.

A workshop, underwritten in large part by the California Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB) was held June 20, 2006 to bring participants involved in the review process up to date on the technical issues which will need to be considered as the revised regulations are developed by CDFA.

Speakers at the workshop included several scientists from UC Davis who are currently working to improve the California R&C program. FPS Plant Pathologist Dr. Adib Rowhani, discussed the uses of different grapevine testing strategies in clean stock programs and for samples from field sites. Dr. Christian Leutenegger, Director, Lucy Whittier Molecular and Diagnostic Core Facility, UC Davis School of Veterinary Medicine, talked about exciting progress in the use of real-time PCR to increase speed and accuracy of grapevine virus testing; Dr. Andy Walker, Department of Viticulture and Enology, UC Davis, talked about variety identification techniques; Dr. Jerry Uyemoto, USDA-ARS Research Plant Pathologist, Davis, reviewed the biology of some of the new grape disease agents; and FPS Director Dr. Deborah Golino, spoke about grapevine virus disease- the primary reason for clean stock programs.

In addition, visiting scientist Dr. Tom Burr, Professor of Plant Pathology, Cornell University, discussed strategies for controlling crown gall in nursery stock, and Mr. Bill Ogden, CDFA associate agriculture biologist, reviewed the history of the California R&C program and described the process for making changes to the regulations.

Audio and visual recordings of all of the June 20, 2006 workshop talks were made and are now available for viewing on the web at <http://fps.ucdavis.edu/Grape/UnexGCPW.html>. Copies of the currently adopted 1984 Grapevine Regulations and proposed regulations from 1997 are also available on the web at <http://fps.ucdavis.edu>.

Future meetings to develop new regulations will be posted on the FPS web site at <http://fps.ucdavis.edu/Meeting.html>. Anyone wishing to be notified individually should send their postal and email addresses to Tracy Pinkelton [trpinkelton@ucdavis.edu](mailto:trpinkelton@ucdavis.edu), or call 530-752-3590. 

# Virus Elimination from Grape Selections Using Tissue Culture

by Susan T. Sim, Staff Research Associate, Foundation Plant Services

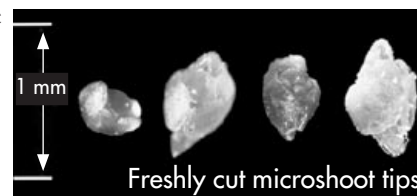
Microshoot tip tissue culture is the method of choice to eliminate virus(es) and other pathogens from many plant species. This method has the advantage of regenerating a single plant from a single, minuscule (approximately 0.5 mm) shoot. The technique also avoids the production of plants from callus which can lead to regeneration of an off type plant. The combination of low hormone levels combined with a minimum time in culture reduces the chance of mutation and regeneration of an off-type plant. At the same time, many pathogens, including viruses, are eliminated by this technique. It is thought that this is because the meristem is growing faster than it can be infected by pathogens that may be present in the older plant tissues.

The FPS grape program was founded in the 1950s and is the largest of the FPS commodity programs. At FPS, growth chamber heat therapy was the technique of choice until the late 1980s, but worldwide, tissue culture techniques were being developed and used extensively for grapevines. FPS first began applying this technology to grapes at FPS in 1988 with support from an industry grant. Further work at FPS throughout the 1990s has resulted in improvements in survival and the rate of virus elimination to the extent that this process is now routine and reliable (Golino et al., 2000). Molecular detection techniques for the grapevine viruses have improved, making it possible to screen young plants regenerated from tissue culture, greatly speeding up the virus screening process (Rowhani, 1992).

Rapidly growing shoots in the spring and early summer provide the best tissue for excision. We prefer to use terminal buds because they are larger, easier to excise and more vigorous than axillary buds. Both field and

greenhouse grown plants perform well as sources of material. Shoot tips about 2 cm long are harvested and brought to the lab. If material from the field is especially dusty, it is rinsed under running tap water for 1 hour with the addition of a drop of dishwashing liquid every 20 minutes. Tissue is then surface sterilized by submersion in 10% commercial bleach plus 1 drop (~0.1 ml) of dishwashing liquid for 10 minutes. Tissue is removed under aseptic conditions and serially transferred through three rinse containers containing sterile distilled water.

Microshoot tips are excised aseptically in a transfer hood under 10–50X magnification with the aid of a zoom binocular dissecting scope. Individual leaf scales are removed to expose the shoot tip; after each cut, the forceps and scalpel are flame sterilized and cooled to prevent contaminating younger, inner tissues with virus particles from older tissue which might be transferred by the blade. When the meristematic dome becomes visible, a final cut is made just at the base of the last several leaf



primordia, and the tip is gently placed on the surface of the initiation medium. If the cut was made at the correct place, the shoot tip will come off easily with a slight touch of the scalpel to the medium surface. It should not be too sticky and the dome should remain turgid and dome-shaped. Microshoot tips are approximately 0.4 to 0.5 mm and include 1 to 3 pairs of leaf primordia.

The initial and maintenance medium is Murashige and Skoog (MS) salts and vitamins with 1.0 mg/l of the cy-

Medium name	BA, mg/l	IAA, mg/l	MS Basal Salts and Vitamins g/l	Sucrose g/l	Uses
<b>MSB</b>	1.0	0	4.43	30	Grape initiation and maintenance
<b>MSB-2</b>	1.0	0	2.22	30	Selected varieties, especially certain grape rootstocks including 101-14 Mgt, Schwarzmann, Riparia Gloire
<b>RM</b>	0	1.0	2.22	15	Rooting

**Table 1.** Tissue culture media used for 0.5 mm shoot tip culture for virus elimination in FPS grape programs. Salts and vitamins are as described by Murashige and Skoog (MS).

tokinin growth hormone 6-benzylaminopurine (BA), 3% sucrose, and 6.0 g/l gum agar adjusted to pH 5.8 (MSB). The rooting medium is half-strength MS salts and vitamins with 1.0 mg/l of the auxin growth hormone indole-3-acetic acid (IAA), 1.5% sucrose, and 6.0 g/l gum agar adjusted to pH 5.8 (RM) (Table 1). Murashige and Skoog (MS) salts and vitamins are a standard mixture of specific nutrients developed for plant tissue culture in 1962 by two scientists, T. Murashige at the University of California, Riverside and F. Skoog at the University of Wisconsin. MS salts and vitamins are available premixed from many sources. We use PhytoTechnology Laboratories, Shawnee Mission, Kansas catalog #M519.

Explants are incubated in a growth chamber at 25°C, 70% relative humidity, 16-hour days, under cool white fluorescent and incandescent bulbs. They are transferred to fresh medium every 3 weeks. When the explants develop a shoot about 2 cm long and 4 to 5 well developed leaves (a minimum of 6 to 8 weeks after excision), they are transferred to rooting medium. When roots are well-developed and the shoot has reached the height of the tube (a minimum of 3 to 9 weeks), the plants are ready to be introduced to soil and greenhouse conditions—a process that takes about 3 weeks. Medium is rinsed off of the roots, roots are trimmed if necessary and plants are transplanted to sterilized potting mix in 2-inch pots. The pots are placed inside a clear plastic Magenta box with the lid on.



Rooted grape plant, being removed from tissue culture medium, is ready to be planted into soil. *Photo by Bev Ferguson*

Over the next two weeks, the plants are gradually acclimatized to ambient humidity by leaving the box lid slightly ajar; then removing it. Finally, the plants are transplanted to 4-inch pots and taken to the greenhouse

Varieties vary tremendously in how well they grow in tissue culture. Usually, more vigorous varieties in the field are also more easily established in tissue culture and less vigorous varieties are more difficult to establish. For this reason, Cabernet Sauvignon is relatively easy to tissue culture and Pinot noir relatively difficult. Many grape rootstocks are difficult to tissue culture. We have found that reducing the MS salts to half-strength will work for some of them; this is usually the first medium variable we try when a selection fails to thrive in tissue culture. Much progress can be made by careful observation and adjust-



Grape transplants (inside Magenta boxes) will be gradually acclimated to ambient humidity. *Photo by Bev Ferguson*

ment of specific medium components. For instance, if explants develop vitrified tissue (stiff, distorted leaves), the next time the selection is excised, we would start with a reduced salt medium; if too much callus develops, the BA level would be reduced. There are almost endless variations of medium components that can be tried, and we are continually experimenting based on the plants' response.

We normally expect that 10 to 30% of the meristem pieces survive tissue culture and become rooted plants. Of those that survive tissue culture, usually 70–100% will test virus negative, depending on the virus type in the source plant. For example, if we cut 100 microshoot tips, we expect anywhere from 7 to 30 of them to grow into healthy plants. Survival, however, is very variable and can be much less or even 0% for certain varieties. The whole process from excision of a <0.5mm shoot tip to a plant in a 4-inch pot takes a minimum of 4 months—and can take a year or longer if the variety is recalcitrant. 🍇

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## In Memory

### Harold P. Olmo

Harold P. Olmo, professor emeritus in the UC Davis Department of Viticulture and Enology, died on June 30, 2006 at the age of 96. Born in San Francisco in 1909, he received a bachelor's degree in horticulture from UC Davis and UC Berkeley, and earned a doctoral degree in genetics from UC Berkeley in 1934. His UC Davis career began in 1931 when he was hired by Albert Winkler to breed grapes, and he continued his grape breeding and improvement work until he retired in 1979. He maintained an office at UC Davis until very recently.

A leading grape geneticist, Olmo was considered the "Indiana Jones" of viticulture as he traveled the world consulting, researching and collecting grapevines—sending hundreds of varieties back from areas including Afghanistan, Brazil, France, Greece, India, Iran, North Africa, Pakistan, Portugal, Spain and Tunisia. His travels took him throughout the United States and northern Mexico collecting grape species. These collections and imported varieties reside at the USDA National Clonal Germplasm Repository in Davis, forming one of the most extensive grape germplasm collections in the world. The collection at Foundation Plant Services includes a large number of selections originating with his collected or bred varieties.

Olmo created thousands of selections, developing grape varieties for wine, table, raisin, juice or rootstock uses.



He released thirty-one varieties, among them the well-known Redglobe, Perlette, Ruby Seedless, Ruby Cabernet, Rubired, Emerald Riesling and Symphony. His work on clonal improvement and productivity gave Chardonnay a boost in California, elevating it from a minor variety to one that is widely planted today. In addition, he was a world renowned expert in grapevine identification.

Olmo's work also led to the creation of California's grapevine clean stock program, which eventually became Foundation Plant Services. In 1951, he published an article entitled "A Proposed Program for the Introduction, Improvement and Certification of Healthy Grape Varieties" in the magazine *Wines and Vines*. His vision, which incorporated specific programs for importing desired grapevine material, quarantine and disease testing of new materials, professional identification for true-to-type verification and propagation of the grapevines for release to industry, along with oversight committees, has been successfully realized at FPS.

His accomplishments have been recognized in many ways, including the Laureate and Medal for Outstanding Contributions to World Viticulture from the France-based Office International de la Vigne et du Vin; the Papal Medal: Benemerenti, from the Catholic Church; the Rockefeller Spirit of Service Award; and a wine 'Olmo's Reward' named after him for his role in encouraging viticulture in Australia. He was a Guggenheim fellow, Fulbright scholar and a consultant to the United Nations.

He is survived by three children and six grandchildren.



The late Harold Olmo (right) conversing with his longtime assistant, Al Koyama (left), and Dr. Andrew Walker at the 2001 dedication of the Winkler vine at the UC Davis campus. *Photo by Bev Ferguson*



### Robert M. Pool

Robert M. Pool, professor emeritus of viticulture at Cornell University, died at his home on June 10, 2006. He was born in Sacramento, California in 1940 and grew up in the San Francisco Bay Area. He graduated from UC Davis with degrees in enology and food science, followed by his doctorate in pomology from Cornell in 1974. He began his distinguished career as an assistant professor of viticulture at Cornell, and, in 1988, became a professor.



Pool's interests covered all aspects of viticultural practices, including the mechanization of pruning, relationships between crop levels and grape and wine quality, sustainable viticulture, vineyard floor management and weed control, effects of cultural practices and rootstocks on cold hardiness, interaction of disease, and vine productivity. He was highly regarded for his teaching abilities and his leadership in viticultural research and extension work, and for his many contributions to New York's wine and grape industries.

He was influential in establishing national grape germplasm repositories at Davis, California and Geneva, New York. He served as chair of the Grape Commodity Advisory Committee to the National Plant Germplasm Committee for 10 years, and on the advisory committees of New York's regional grape extension specialists, and on Cornell University's statewide fruit extension committee. He was dedicated to his extension work, writing numerous publications, organizing research tours and presentations, and training extension agents.

He was a member of the American Society of Viticulture and Enology, International Society for Horticultural Science, and the American Society for Horticultural Sciences. Among the awards he received was the Cantarelli Prize for 1995-96 from the Italian Academy of Vine and Wine, in recognition of his work on the mechanical regulation of crop load and fruit quality in grapes and the impact of this work on lowering production costs for the industry.

Recently, he opened his own vineyard and winery, Billsboro, in Geneva. It was the realization of a lifelong dream. Pinot noir wines, made from clones he selected based on his research, were among his featured varietal

wines. He also enjoyed singing in church choirs and sharing food and wine with friends and family.

Pool is survived by his wife of 25 years, Jennifer Morris, his sons Ron and Alex of Geneva, his daughter Margaret (Bruce) Mills of N. Palm Beach, Florida; sisters Margaret Baker of Castro Valley, California and Judy (Jack) Langdon of Knaresborough, England; three grandchildren, and several nieces, nephews and great nieces and nephews.

Memorial contributions may be made in Pool's name to the Mission Committee Fund for Youth Mentoring, care of the Presbyterian Church, 24 Park Place, Geneva, N.Y. 14456.

### David James Godfrey

David James Godfrey, 57, passed away unexpectedly at his home in Rocklin on April 11, 2006. Mr. Godfrey had lived in Rocklin with his wife and family for the past 20 years.



David was born in Bakersfield on July 23, 1948. After graduating from Bakersfield High, he later obtained a bachelor's degree in biology from Fresno State University. It was at the university where he met his future bride, Cynthia J. Trumbo. They were married on August 29, 1970.

David worked for the California Department of Food and Agriculture for 33 years, working at various positions in Mono and Siskiyou counties. His career with the department eventually took him to Sacramento where he became a program supervisor in the Pest Exclusion Branch.

David loved fishing, playing the acoustic guitar, and going to drag races. But he especially loved traveling and spending time with family. He was a creative person, a talented cook, an innovative landscaper in his backyard, but most of all he was a proud and doting "Papa" to his grandkids.

He is survived by his wife of 35 years, Cynthia; children, Micah Godfrey and Rebekah Godfrey, both of South Placer County, and Sarah Green of Florida; grandchildren, Collyn and Connor Green of Florida, Jackson Kiehl and Keith Power of South Placer County; mother, Mildred Godfrey of Roseville; sister, Linda Pott of Elk Grove; nieces and nephews, Jessica, Christine, David, Michael and Daniel; mother-in-law Lavern Trumbo of Rocklin; and brothers-in-law, Joel Trumbo of Elk Grove and John Trumbo of Kennewick, Wash.

*New Varieties... continued from page 1*

this vineyard, including Durif, Peloursin and Syrah, as part of a project to collect “old vine” selections for a Petite Sirah planting at the Oakville Field Station. Dr. Jim Wolpert, UC Davis Cooperative Extension viticulture specialist, said “It was not a systematic look for old selections of the three kinds of Petite. The fact that the three types of Petite [Durif, Peloursin, and Syrah] were in this vineyard, suggested to me that they were part of the black variety ‘field blend’ that was used at the time. That block also contained Alicante Bouschet, Carignan, Mourvedre and Grenache.” The original material for all three selections was infected with virus, so microshoot tip tissue culture was used to create Durif FPS 04, Peloursin FPS 01 and Syrah FPS 15.

**Syrah FPS 13 and FPS 14** initially came to UC Davis from the Viticulture and Horticulture Establishment in Milan, Italy in 1949 and the French Richter Nursery in 1936, respectively. The original materials are now part of the collection at the USDA National Clonal Germplasm Repository (NCGR) at Davis. FPS received propagation materials from the NCGR which tested positive for virus. Microshoot tip tissue culture was used at FPS to eliminate the virus and create FPS 13 and 14.

**Fiano FPS 02** was created from original material sent to FPS from the Mastroberardino Winery in Avellino, Italy in 2000. Microshoot tip tissue culture was used to eliminate virus and create Fiano FPS 02. Fiano is a white wine variety being revived by Mastroberardino. According to Jancis Robinson, Fiano was used by the Romans to make a wine called Apianum in the hills above Avellino.

**Garnacha gris FPS 01** was created using microshoot tip tissue culture from material sent to FPS in 2000 by Jesus Yuste from the Instituto Tecnológico Agrario de Castilla y Leon (ITACyL), Valladolid, Spain. The original material was designated clone CL33 by ITACyL. According to Yuste, Garnacha roja is a synonym for Garnacha gris CL33. For more information, see the article by Yuste in the 2005 *FPS Grape Program Newsletter*.

**Marsanne FPS 04** was created using microshoot tip tissue culture from a selection donated to FPS in 2000 by a Sonoma County, California nursery.

**Molinara FPS 01** was made from original material imported in 1981 from the Italian nursery Zanzivivai Ferrara SRL. Sixty days of heat treatment in 1985 did not remove leafroll from the original material, so plants were produced from the heat treated selection using microshoot tip tissue culture. The second treatment did successfully produce a selection that qualifies for the

foundation collection and which has been designated Molinara FPS 01. According to Jancis Robinson, Molinara is a red wine variety used in combination with Corvina, Rondinella and Negrara to make Valpolicella wine in the Veneto region of Italy.

**Pinot blanc FPS 09** is reported to be from the French clone 54. It came to FPS from Oregon State University in 1987. Microshoot tip culture was used to eliminate virus from the original material.

**Pinot noir FPS 118** is reported to be from the French clone 290. However, there is no clone 290 in the 1996 *Catalogue of Selected Wine Grape Varieties and Certified Clones Cultivated in France*. The original material was imported from France in 1984 by Dr. Austin Goheen, USDA-ARS plant pathologist. This clone was released previously by FPS as a non-registered Rupestris stem pitting (RSP)-positive selection (FPS 34). Microshoot tip tissue culture was used to create FPS 118 from FPS 34.

**Riesling FPS 21** was created from White Riesling FPS 14, which came from the German clone 365 imported from Landes Lehr und Forschungsanstalt, Neustadt in 1963. White Riesling FPS 14 was planted in the foundation block in 1970, but it does not appear on any of the FPS lists of registered selections in the 1970s or 1980s, even though all of the original virus tests were negative. In 1981 White Riesling FPS 14 tested positive for RSP, which would have disqualified it for the R&C program at that time. In 2003 the names of all of the White Riesling selections at FPS were changed to Riesling because Riesling is better recognized internationally and it is the TTB approved name. Riesling FPS 21 was created from FPS 14 using microshoot tip tissue culture.

**Riesling FPS 22** was made from White Riesling FPS 13, which originally came from Fernandez-Montero, Mendoza, Argentina in 1961. White Riesling FPS 13 was planted in the foundation block in 1967, but it does not appear on any of the FPS lists of registered selections in the 1970s or 1980s. White Riesling FPS 13 tested positive for RSP in 1981, which would have disqualified it for the R&C program at that time. In 2003 the names of all of the White Riesling selections at FPS were changed to Riesling because Riesling is better recognized internationally and it is the TTB approved name. Riesling FPS 22 was created from FPS 13 using microshoot tip tissue culture.

**Saint George FPS 19** is from the Italian clone ISV 19-1-6, which was donated to the public FPS collection by the Vivai Cooperativi Rauscedo (VCR) nursery in 2001. All virus tests for the original material were negative

(including tests for RSP), so this source qualified for release from quarantine without any disease elimination treatment.

**Sangiovese FPS 26** is from the Pepi Vineyard “Alexander Valley Estancia” clone that was collected for FPS in 1996. Microshoot tip tissue culture was used by FPS to eliminate virus from the original material. [More information is included in the *Sangiovese at FPS* article beginning on page 16 of this issue of the *FPS Grape Program Newsletter*.]

**Sauvignon blanc FPS 31** is reported to be from the French clone 297. It came to FPS from a Canadian nursery in 1999. Microshoot tip tissue culture was used to eliminate leafroll from the original material to create FPS 31.

**Semillon FPS 14** came from material imported from New South Wales, Australia in 1982. The original material was released from quarantine in 1993 and designated FPS 10. FPS 10 was planted in a block of non-registered vines because it tested positive for RSP, and RSP was excluded from the R&C program at the time. Microshoot tip tissue culture was used to create FPS 14 from FPS 10. FPS 14 tested negative for RSP.

**Tempranillo FPS 12** came from Ribera del Duero, Spain via a California vineyard in 2001. [More information about this selection is included in the *Tempranillo at FPS* article on page 11 of this issue of the *FPS Grape Program Newsletter*.]

**Tinta Barocca FPS 02** was made from material that was imported from Portugal in 1981 by the late Dr. Harold Olmo, emeritus professor, UC Davis Department of Viticulture and Enology. Microshoot tip tissue culture was used to eliminate leafroll and RSP from the original material. Tinta Barocca is a drought resistant red port wine variety. DNA tests showed that the tissue culture plant matches Tinta Barocca references from Portugal, so we expect Tinta Barocca FPS 02 to be the first correctly identified selection for this variety in the foundation block. Provisional vines of Tinta Barocca FPS 01 were recently removed from the foundation block because they were incorrectly identified.

### **New Selections Replacing older materials dropped from the program**

**Colombard FPS 06:** French Colombard FPS 02 was removed from the foundation vineyard in 1995 because leafroll spread into some of the FPS 02 registered mother vines. At the time, FPS 02 was not saved because it was likely to be genetically identical to leafroll-negative and registered French Colombard FPS 01. French

Colombard FPS 01 is from the Weil Vineyard near Santa Rosa, California, and French Colombard FPS 02 was made by heat treating FPS 01 back in 1965. After FPS 02 was abandoned by FPS, Pete Christensen (1995) scored it as the best of three (FPS 01, 02 & 03) French Colombard selections evaluated in a San Joaquin Valley wine cultivar clonal trial. FPS 02 was therefore collected again from the Nyland registered increase block in Davis, CA in 2004. The Nyland source tested negative for leafroll using field and ELISA tests conducted in 2004 and 2005, so it qualified to be planted in the foundation block again without any treatments. The name for all FPS French Colombard selections was changed to “Colombard” in 2003 because Colombard is better recognized internationally and is the TTB approved prime name. The new selection of French Colombard FPS 02 from the Nyland block is now designated Colombard FPS 06.

**Dattier de St. Vallier FPS 02** is a hybrid “desert grape” variety bred in France by Seyve-Villard and released in 1930. Dattier de St. Vallier FPS 01 was imported from Conegliano, Italy in 1968. Registration for FPS 01 was removed in the early 1980s when it tested positive for RSP. Dattier de St. Vallier FPS 02 was created from FPS 01 using microshoot tip tissue culture.

**Durif FPS 05** was created from Petite Sirah FPS 05, which came from the UC Davis Viticulture and Enology (VEN) vineyards and was dropped from the R&C program in 1982 because it tested positive for leafroll. The name was changed from Petite Sirah to Durif in 2003 because DNA tests have shown that Durif is the most accurate name for this selection. Microshoot tip tissue culture was used to create Durif FPS 05 from Petite Sirah FPS 05.

**Flame Tokay FPS 07** was created from FPS 03, which was dropped from the R&C program in 1993 when the old foundation vineyard was abandoned. The original source for FPS 03 was a vineyard in Woodbridge, California sometime before 1960. Microshoot tip tissue culture was used to create FPS 07 from FPS 03.

**Gewürztraminer FPS 21** was created from FPS 05, which was from the Jackson Vineyard in Amador County, California (see article about Jackson Vineyard on page 24 of this issue of the *FPS Grape Program Newsletter*). FPS 05 was dropped from the R&C program in 1992 because tests showed that leafroll had spread into the FPS 05 foundation mother vines. Microshoot tip tissue culture was used to create FPS 21 from FPS 05.

**Gewürztraminer FPS 22** is from FPS 07, which came originally from Pont de le Maye, France in 1962 labeled

“Gewurtz Traminer CL1634.” FPS 07 was dropped from the R&C program in the early 1980s because it tested positive for leafroll and RSP. Microshoot tip tissue culture was used to create FPS 22 from FPS 07.


**Helena FPS 03:** Helena is a white wine variety bred by the late Dr. Harold Olmo, professor emeritus, Department of Viticulture and Enology, UC Davis, and released in 1958. Helena FPS 01 and 02 were both dropped from the R&C program in the early 1980s because both tested positive for leafroll, so no virus-tested Helena has been available from FPS for more than 25 years. FPS 03 was created from FPS 01 using microshoot tip culture.

**Siegerrebe FPS 02** was created from FPS 01, which was originally imported from Landes Lehr und Forschungsanstalt fur Wein und Gartenbau, Maximilianstrasse, Germany in 1962. This highly flavored white wine variety is a result of the cross Muscat Coustillier (table grape) X Gewurztraminer. FPS 01 was dropped from

the R&C program in 1981 because it tested positive for RSP. Microshoot tip culture was used to create FPS 02 from FPS 01.

**Sylvaner FPS 12** was created from Sylvaner B2 FPS 06, which was originally imported from Nyon, Switzerland in 1968. FPS 06 was dropped from the R&C program in the mid 1980s. Sylvaner is a white wine variety that is thought to have originated in Austria. The name was changed from “Sylvaner B2” to “Sylvaner” because “B2” was likely a clone designation assigned in Switzerland. In Germany the name is spelled “Silvaner”, but for now Sylvaner is the name recognized by the TTB and the spelling used at FPS. Tissue culture was used to create Sylvaner FPS 12 from Sylvaner B2 FPS 06.

#### **Literature cited:**

Christensen, Pete, Clonal Testing of Wine grapes in the San Joaquin Valley, American Vineyard Foundation Research Report, June 1, 1995 



The FPS grape index, foreground planting, is one of the methods employed to detect virus in grapevine planting materials. Two buds of the plant being tested are grafted onto an indicator plant—a variety chosen for its display of characteristic symptoms when infected. The indicator plants are grown for two years in the field, and then visually checked for virus symptoms. New varieties, including quarantine material, go through the field index in addition to biological and laboratory testing. Foundation stock is also regularly screened in the field index. Close to 7,000 plants were put into field testing this year. *Photo by Bev Ferguson*