

Riesling Selections

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THIRTY-ONE ENTRIES APPEAR when a cultivar search is performed on the name 'Riesling' on the *Vitis* International Variety Catalogue (VIVC) website www.vivc.bafz.de. The 'true Riesling' alone shows 120 synonyms on that website. White wines made in the German style with cultivars other than Riesling were often given the Riesling name. Name ambiguity has interfered with a clear identity for the true Riesling.

Riesling is versatile in terms of viticultural and enological traits. The cultivar is sensitive to the climate and soil in which it is grown, resulting in distinctly different flavors in the wines. Riesling can produce wines that are dry, medium dry, medium sweet or sweet. Shifting wine preferences have prevented the cultivar from forming a clear impression on wine consumers, particularly in California.

The Riesling grape's popularity in California has taken an uneven course. Recent trends suggest that interest is again rising. The Riesling collection at Foundation Plant Services (FPS) offers some of the best clones from the old world as well as selections that originated in California vineyards over one hundred years ago.

THE IDENTITY PROBLEM

The noble Riesling grape has a long and rich history in Germany, where it is grown along the Rhine River and its tributaries. Most authorities believe that the white wine cultivar originated in that cool temperate area around the Middle Ages. In the interim, other grape cultivars, Riesling imposters and distant relatives of the true Riesling have adopted its name to gain marketing advantage and cause confusion over the identity of the true Riesling.

In 1998, scientists in Austria used DNA technology to create a partial identity for the 'true Riesling'. They were able to determine that one of its parents is Heunisch weiss, which is known in France as Gouais blanc, the sire of other important wine cultivars such as Chardonnay, Sémillon, Gamay noir, Melon and Aligoté. Riesling and Heunisch weiss share one allele at all loci. *Regner et al., 2000-Genetic; Regner et al., 1998a.*

Heunisch weiss is a late ripening cultivar that was able to flourish in northern Europe in the Middle Ages because of a 700 year warm climate phase at that time. *Jung and Maul, 2004; Regner et al., 1998a.* The grape was supposedly imported to Europe by the Huns and was called *vinum hunicum* in the literature of the Middle Ages. Although the Heunisch vines produced wine of poor quality, that cultivar was an important crossing partner for wild vines



Riesling FPS 09 in the FPS Foundation Vineyard came from Germany in 1952 and was first named 'White Riesling.' *Photo by Bev Ferguson*

and other grapevines in the cooler climates during that era. *Regner et al., 2000-Considerations; Regner et al., 2000-Genetic.*

The Austrian scientists were unable to identify Riesling's second parent. But they concluded that Riesling originated by a probable cross of the Heunisch variety with the other main gene pool mentioned in viticulture during the Middle Ages, the Fränkisch pool (*vinum francicum*). *Regner et al., 1998a.*

The Fränkisch pool shows close genetic ties to some wild *Vitis sylvestris* genotypes, which are the wild type *vinifera* of the region. *Forneck et al., 2003; Regner et al., 2001.* *Vitis sylvestris* existed and spread throughout western Europe for a very long time before cultivated grape varieties were imported to the region. It is not clear whether western European grape cultivars evolved from the local wild type or originated from imported cultivars. *Walker, 2009.* One group of scientists concluded that Riesling did not directly originate from a native wild grapevine. *Perret et al., 2000.*

The Austrian scientists mention one of the representative grape cultivars of the Fränkisch gene pool, the grapevine known as Traminer, as a candidate for Riesling's second parent. Traminer shares enough alleles with the *Vitis sylvestris* population to indicate at least a close relationship between the two, if not parentage. *Regner et al., 2000-Considerations.* Traminer was distributed throughout northern Europe by the Romans and provided a higher quality wine in terms of better sugar, higher extract values and more complex aroma. *Regner et al., 2001.*

When a pedigree search is performed on Riesling weiss in the *Vitis* International Variety catalogue (VIVC) at Geilweilerhof, Germany, the second parent for Riesling is shown to be *Vitis sylvestris* or (*Vitis sylvestris* x *Traminer*). However, the second parent for Riesling has not yet been definitively qualified by reported DNA findings.

If a grape has been cultivated in Europe since the Middle Ages, the cross would have occurred at least 500 years ago. Neither the geographic nor the genetic origin of a grape cultivar from that time in Europe was recorded. It is known that both Heunisch and Traminer were important crossing partners throughout Europe during the Middle Ages, and the names of both cultivars have been documented from that time. *Sefc et al., 1998.*

Riesling has been cultivated in Europe since medieval times. Specific grapevine cultivar names began to appear in documentation in the 14th and 15th centuries. Traminer (1349) and Riesling (1435) were among the earliest to be mentioned. *Sefc et al., 1998.* The most likely first written reference in Germany to the grape cultivar Riesling was in a 1435 storage inventory for a castle on the Rhine near Hochheim (in the Rhinegau): twenty-two *soliden* (currency) for *umb seczreben Riesslingen in die wingarten.* *Fischer, 2007; Price, 2004.* The first mention of the cultivar using the more familiar spelling was in 1552 in Hieronymous Bock's Latin *Herbal*: '*Rieslinge* grows in the Mosel, Rhine and in the Worms region.' *Fischer, 2007; Price, 2004.*

Riesling flourished in the Rhine Valley region of Germany in the Middle Ages. The Rheingau is an old cultural region on the Rhine River surrounding Geisenheim and is considered by some to be the traditional home of Riesling. Geisenheim is the home of the famous viticultural institute and winemaking school. The region dates back to pre-Roman times with Celtic settlements.

The first Holy Roman Emperor Charlemagne built the Ingelheim Imperial Palace around 807 A.D., across the river from Geisenheim. Legend has it that Charlemagne himself was the first to order that vines be planted on the steep, south facing hill visible across the Rhine from the palace, because he saw that this was where the snow melted first each spring.

That vineyard site across from the Ingelheim palace is the now-famous Schloss Johannisberg—the first estate to plant a vineyard exclusively in Riesling and the location where late harvesting of Riesling grapes to make naturally sweet wine was discovered. For a time, Riesling in California was referred to as Johannisberg Riesling because of this association. *Asher, 2002; Pigott, 1991.*

From the 16th century, Riesling became recognized as the finest white wine grape in Germany, which then included the Alsace region. It was considered a luxury grape because of its low yield. Riesling was planted in 'the best sites for the connoisseurs of the time' (the church and the aristocracy). In successive centuries, church and political figures promoted the grape by ordering that 'Rissling' be planted to the exclusion of, or to replace, other varieties. *Fischer, 2007; Price, 2004.*

The Mosel region was also home to Riesling from early times. Trier was an important Roman town where *Vitis vinifera* was cultivated by 286 A.D. The most important church decree related to Riesling came from Clemens Wenzeslaus, Elektor of Trier (Mosel), on May 8, 1787. He ordered the removal of all inferior ('poor') vines and re-planting with 'good' grape varieties. Riesling was the only good white grape in the region at the time. *Fischer, 2007.*

German Riesling achieved great success in the 19th century, when Riesling prices were comparable to the great wines of Bordeaux and Burgundy. During that century Riesling grapes were first imported to California.

Identification of the true Riesling is no longer an issue given DNA technology. The primary European names of the 'true Riesling' are Riesling, Riesling weiss or Weisser Riesling. The European name translates into 'White Riesling' for the United States. Another complication exists with the use of synonyms, which is a problem with most European grape cultivars. Of the 120 synonyms listed, the most common in Europe include Rhinerriesling (Austria) and Riesling renano (Italy).

The name Riesling became ambiguous in Europe and the United States when imposters and distant relatives of the true cultivar assumed the name. In Europe, some lesser quality cultivars genetically unrelated to Riesling weiss adopted its name e.g., Riesling Italic (Welschriesling; Walschriesling); Schwarzriesling or Orleans Riesling (Pinot meunier), and Laski Rizling. Distant relatives frequently carried the name, sometimes by way of a well-used synonym e.g., Frankenriesling (Sylvaner gruen); Müller-Thurgau (also known as Riesling-Sylvaner). In Australia, Sémillon grapes were used to make Hunter Riesling or Shepherd Riesling.

The Riesling grape also suffered from identity confusion in the United States, where unrelated cultivars and distant relatives again adopted the name – Grey Riesling (Trousseau gris); Missouri Riesling; Hungarian Riesling (Italian Riesling progeny); Emerald Riesling (Muscadelle du Bordelais x Riesling). Often wines made in the 'German style' from high acid, light-colored grapes such as Sylvaner and Burger were given the Riesling name even when Riesling grapes were not included in the blend e.g., Hungarian Riesling, Grey Riesling, Kleinberger Riesling.

The naming confusion was perpetuated by an additional twist when the grape came to California. References in California writings from the late 19th century refer to both White Riesling and Johannisberg Riesling. The latter name was a misnomer, as there was no such cultivar abroad. *Amerine and Winkler, 1944.* The name was apparently adopted 'by courtesy after the famous vineyard at Schloss Johannisberg, where it predominated.' *Wetmore, 1884; TTB, 1999.*

Charles Wetmore, Executive Director of the Board of State Viticultural Commissioners, explained in 1884: "Custom has, however, attached the name [Riesling] to other varieties, so that when we wish to speak of this genuine variety, we must now use the word *Johannisberg* to identify it." *Wetmore, 1884*. Premium wine producers came to use the words 'Johannisberg Riesling' to signify that the wine was made primarily or entirely from the White Riesling from the Mosel or Rhine. *Sullivan, 1994, 2008; Sullivan, 1998*.

Riesling vines were planted in the University of California's former Foothill Experiment Station in Jackson, California, in 1889 under the name Johannisberg Riesling. The same cultivar was given the name White Riesling in university vineyards in the first half of the 20th century.

In 1996, the federal Tobacco, Tax and Trade Bureau (TTB) ruled that the name Riesling may not be used on wine labels in the case of any grape that is not really a Riesling. Only the names Riesling (or the synonym White Riesling) were to be allowed on the labels. The purpose of the regulation was to standardize wine label terminology and reduce consumer confusion by reducing the number of synonyms on wine varieties. *TTB, 1999*.

In 1999, the TTB granted an extension to phase out the name Johannisberg Riesling from wine labels until after January 2006 because Johannisberg Riesling was 'not a correct name, was a German geographic term and was a specific winegrowing region in Germany.' In the course of the regulatory process, winemakers argued that many 'inferior Riesling products had been produced in the 1960's and 1970's and that the name Johannisberg Riesling was used to distinguish what they believed was their superior Riesling product.' They indicated that it would take several years to educate American consumers that the term 'Riesling' standing alone designated the same wine previously known as Johannisberg Riesling. *TTB, 1999*.

Wine writer and historian Charles Sullivan wrote that Riesling has been a confusing term in the history of California wine, and until 1997 (extended to 2006), was a term that might go on wine labels as a sort of generic expression. *Sullivan, 1998*. Wine writer Jancis Robinson wrote that the name Riesling was debased in the 1960's and 1970's by being applied to 'a wide range of white grape varieties of varied and often doubtful quality.' *Robinson, 2006*.

Ambiguity related to varietal name and frequent use of synonyms has caused confusion as to the identity of the 'true Riesling,' particularly in California. The cultivar seems now to have attained a clear definition. This article features only the FPS selections that are true Riesling and carry the name Riesling or Riesling renano.

RIESLING COMES TO CALIFORNIA

California wine makers in the 1850's believed that great wine would probably come from the established European cultivars. Riesling was one of several German cultivars (along with Sylvaner and Traminer) that helped propel the nascent California wine industry to a measure of fame in the 1870's. *Sullivan, 1998*.

In the coastal counties of Northern California, the market demanded white wines in the German style and valued White Riesling (also known as Johannisberg Riesling) for its style and elegance. *Sullivan, 2003*. Darrell Corti, a wine merchant in Sacramento, California, characterizes this elegant German-style Riesling wine as semi-dry or dry, with low alcohol, refreshing and delicious to taste with good aging ability. *Corti, 2009*. Other less elegant German-style white wine and blends made from other cultivars were occasionally given the Riesling name or were designated as *hock* (German style white wines, usually with a large amount of Burger grapes in the blend). *Sullivan, 1998*.

German immigrants were primarily responsible for bringing Riesling to California around the middle of the 19th century, at the time that the cultivar was very popular in Europe. *Sullivan, 2003*. Some immigrants settled in Santa Clara and Sonoma Counties, and by 1856 those counties began to grow in importance in grape acreage planted. *Peninou, 1998; Carosso, 1951*.

Francis Stock was probably the first to import Riesling to California to his San Jose nursery prior to 1857. *Teiser and Harroun, 1983; Carosso, 1951*. Stock supplied Riesling cuttings to Dr. George Crane in Napa in 1859; these are believed to be Napa's earliest Riesling. *Teiser and Harroun, 1983*. Emil Dresel and Jacob Gundlach planted vineyards that would become Rhine Farm in Sonoma County in 1858. In 1859, Dresel returned to his home in Geisenheim on the Rhine and brought back Riesling cuttings. *Sullivan, 1994, 2008; Sullivan, 1998; Peninou, 1998*. Agoston Haraszthy secured Riesling cuttings on his trip to Europe in 1861 from the Rheingau region for his Buena Vista vineyard. *Sullivan 1994, 2008; Peninou, 1998*.

As Riesling is a cool climate grape, there are only a few regions in California that support growth of the cultivar at its full potential for high quality wine. Riesling has hard wood, which allows it to be cold hardy and frost resistant for cool wine regions. Additionally, the buds are able to withstand winter's cold temperatures. The bunches are compact and susceptible to botrytis and coulure. The botrytis allows for the production of a range of sweet wines as a result of botrytis dessication. *Walker, 2009; Robinson, 2006*.

The variety is adaptable to a wide range of soil types, with highest vigor on fertile soils with high moisture availability. Crop size can range from 4 to 8 tons per acre in California, but Riesling tends to overcrop when grown on deep, fertile soils. *Bettiga, 2003*. Darrell Corti explains that Riesling is more sensitive to soil conditions than are other cultivars. There is a slate flavor in Riesling wines grown on slatey soil and a broad or flat taste to wines grown on the loamy soil of the Palatinate in Germany. *Corti, 2009*.

One of Riesling's unique viticultural characteristics that allows for diverse wine styles is a long, slow ripening period influenced by warm summers and cold winters. The late-budding cultivar ripens early compared to most cultivars but late relative to other German plantings. The long ripening period allows for a selective harvest for desired ripeness, good flavor and acidity which would decrease over a long ripening period. *Walker, 2009; Robinson, 2006*. The result is wines with flavor diversity, from dry to very sweet dessert wines, botrytized specialties and delicate ice wines. *Fischer and Swoboda, 2007; Bettiga, 2003*.

A distinctive feature of wine made from this grape is its powerful aroma. Early ripening in warmer regions can cause the wine to lose that aroma and quality and taste dull due to the loss of acidity. *Robinson, 2006; Wetmore, 1884*. The limited supply of cooler climate areas in California inhibited the widespread planting of Riesling in the state.

Wine historian Charles Sullivan wrote that the cooler climate of Sonoma allowed winemakers to approach the German ideal for Riesling more closely than did the Napa climate. He noted that the upper Napa Valley climate was too warm. *Sullivan, 1994, 2008*. Eugene Hilgard, head of the new Department of Viticulture and Enology at UC Berkeley, spoke at the 1886 Viticultural Convention: "When a Riesling must be rushed through four or five days' fermentation, under the influence of a hot September in the Napa Valley, it is no wonder that its relationship to the produce of Johannisberg is suspected." *Sullivan, 1994, 2008*.

In 1884, Charles Wetmore noted that good Riesling was only going to come from vineyards 'where over-maturity is difficult to obtain' and where at the time of ordinary ripening the must does not exceed 22% in sugar. *Wetmore, 1884*. He wrote that "[Riesling] is an early ripener, otherwise it would not succeed on the Rhine. Experience in Europe shows that it loses its aroma and quality when cultivated in warmer countries and situations where later ripening varieties come to perfection. On the Rhine the

greatest perfection is often obtained only when the berries are left on the vines until long after the usual time of vintage." *Wetmore, 1884*.

In the 1940's, UC Professors Amerine and Winkler conducted germplasm trials at UC Davis to determine the wines best suited to California viticultural regions. *Walker, 2000*. In a 1944 publication, the professors grouped the grape districts in the state of California into five climatic regions based on heat accumulation degree days.

Amerine and Winkler recommended White Riesling for high quality dry table wines only in the predominantly coastal counties of regions I and II. They concluded that White Riesling should produce superior wines in region I (Oakville in Napa County; San Benito County; Saratoga in Santa Clara County; Santa Cruz County; and parts of Sonoma County) and fairly good wines in the cooler areas of region II (Monterey County; parts of Napa County; Santa Barbara County; parts of Sonoma County). *Amerine and Winkler, 1944*.

Dr. Larry Bettiga, UC Viticultural Farm Advisor for Monterey, San Benito and Santa Cruz Counties, cautioned about placement of Monterey and Santa Barbara Counties completely within Winkler region II, stating that those two counties have 'some of the coolest growing regions in the state.' *Bettiga, 2009*. At the time of the Amerine and Winkler study (1944), those counties were minor grape growing areas and may not have received extensive testing in the study.

California preferences

Riesling has had an inconsistent track record in terms of acreage planted and wine popularity during the past 150 years in California. In the 1980's, the grape declined in popularity due to a shift in preference to a drier wine style. Recent evidence suggests that Riesling is regaining an audience.

Frederic Bioletti, of the Department of Viticulture at the University of California, did not place White Riesling on his 1907 list of recommended grapes for California. In 1921, the California acreage figure for Riesling (including Franken, Gray and Johannisberg) was estimated at 2000 acres, out of a total of 22,000 acres of white wine grape acreage. *California Grape Grower, June 1922*. In a publication in 1929, Bioletti reviewed the list of principal grapes grown in California at that time and mentioned 'Johannisberger [sic.] Riesling' only in passing reference as a blending grape with Franken Riesling (Sylvaner). *Bioletti, 1929, rev. 1934*.

Prohibition decimated the small California Riesling crop, although Riesling, Cabernet and Zinfandel were the only three varieties named in a category of their own when the State Fair wine competitions resumed in Sacramento in 1934. *Sullivan, 2003*. Department of Agriculture statistics for 1941 to 1945 show no mention of reportable acreage for White or Johannisberg Riesling in California. *California Crop and Livestock Reporting Service, CDFA Bureau of Agricultural Statistics, December 17, 1945*.

After WWII, wine makers in Germany and the United States began to make sweeter wines, which were increasingly favored by the consumer. California winemakers such as Martini and Wente made the first late-harvest botrytized quality Rieslings in the 1960's. *Corti, 2009*.

In 1960, only 282 acres of White Riesling were being grown in California. *Sullivan, 1998*. Small plantings were begun in the coastal counties between 1968 and 1972. *Winkler, 1964*. Meaningful acreage (1000 to 2000 acres of White Riesling grapevines per county) existed in Sonoma, Napa, Monterey, and Santa Barbara Counties by 1975, with small plantings in Mendocino and San Benito Counties. *Sullivan, 1998*.

In 1976, White Riesling ranked 4th in acreage (8,552 acres) among all white wine varieties (96,450 total acres) in California, behind French Colombard, Chenin blanc and Chardonnay. *Olmo, 1978 – unpublished*. The popularity of young, fruity, slightly sweet White Riesling and Chenin blanc premium wines crested in the late 1970's. *Sullivan, 1998*. Less expensive wines were made from high acid, low color grapes from cultivars other than Riesling but were given the Riesling name, e.g., Grey Riesling, Hungarian Riesling. This wine was made in a light, fragrant, fruity style popular with consumers.

The amount of White Riesling acreage in the coastal areas of California began to decrease between 1979 and 1985 in all counties except for Monterey and Santa Barbara. *Sullivan, 1998*. At the World Vinifera Conference on Riesling in Seattle in 1989, concern was expressed that in the period 1978 to 1988, vineyards of other major white wine varieties in California tripled while the area under Riesling vines fell from 8,327 acres to 6,839. *Asher, 1989*.

The Riesling wine boom peaked in the mid to late 1980's with the simultaneous ascendancy of French style dry white wines such as Chardonnay and Sauvignon blanc. The popular preference for dry white wines, along with the perception that Riesling 'is a sweet wine,' contributed to a smaller footprint for the variety in California. Riesling grape acreage in the state shrank from 11,423 acres in 1983 to 1,850 acres by 2003. *Robinson, 2006*.

Recently, sales of quality Riesling wines have increased significantly, suggesting a renaissance for quality wine now made primarily in a dry, fruity style.

In November 2006, *Wine Business Monthly* reported in an article entitled 'Riesling: The new darling white wine': "[b]etween November 2003 and August 2006, sales of the varietal have grown by 72 percent while case volume has increased 58 percent...Sales of Riesling are so strong that some believe the varietal may eventually challenge Sauvignon blanc's place as the third-largest white varietal sold in food stores." *Tinney, 2006*. A second magazine article in 2008 reported that Riesling consumption in the United States rose 54% between 2006 and 2008. *Hall, 2008*. Another author proposed that Riesling has begun to challenge Chardonnay's dominance because of Riesling's 'rich theme and variations.' *Goldberg, 2008*.

In California, Riesling acreage has almost doubled since 2000, albeit on a much smaller base than other California white wine grapes. The premium Riesling wines are limited to the few counties in California that can offer the cooler climate in which the cultivar excels. The total number of acres of White Riesling planted in 2008 was 3,073 acres; 2,322 bearing and 751 non-bearing. The total acreage is up from 2,861 in 2007. Monterey County has by far the most acreage of Riesling at 1,746 acres, followed by Santa Barbara County with 245 acres. *CDFA, 2009*. By comparison, Chardonnay remains at the top for white wines with a total of 91,522 acres.

In 2003, when the Riesling acreage reached its low point of 1850 acres, the total tons of White Riesling grapes crushed in the state of California was 8,467 tons. The number of tons has steadily increased since that time and was 15,397 tons in 2008. *Grape Crush Report, 2003 and 2008, www.nass.usda.gov/ca*.

There is still evidence of confusion among consumers related to Riesling wine. An October 2008 article in *Wine Business Monthly* reported that research commissioned by the International Riesling Foundation (IRF) showed that almost half of the respondents think Riesling is 'sweet' and do not understand the terms 'off-dry' and 'late harvest.' The survey concluded that consumers do not know what to expect in a bottle of Riesling. Riesling Sugar Guidelines have been proposed to educate consumers and the trade on the differences between dry, medium dry, medium sweet and sweet categories (sugar and acid ratios). *Hall, 2008*.

RIESLING SELECTIONS AT FPS

The FPS Riesling collection contains selections that originated in California, Germany, France, Italy, Australia and Argentina. When ‘true Riesling’ vines came to Foundation Plant Services before 2003, they were given the name White Riesling, one of the accepted synonyms for the cultivar. The FPS selections with that name were renamed with the simple ‘Riesling’ name in 2003 because that name was the preferred prime name internationally and was the TTB-approved prime name for wine labels in the United States.

SELECTIONS WITH CALIFORNIA ORIGIN

UC Professor Harold Olmo conducted clonal selection of grape cultivars in California in the 1940’s and 1950’s. His goal was to select variants in vineyards across the state emphasizing good cluster formation, high yields, fruit quality and disease free status. *Walker, 2000*. Olmo identified White Riesling as an important commercial variety in California in the 1940’s; he commented at the time that White Riesling was a premium cultivar known to be ‘variable and unreliable.’ *Olmo, H.P. 1942 and 1964*.

Olmo began clonal selection work on Riesling around 1950. **Riesling FPS 10** and **Riesling FPS 28** represent fruits of that effort. The two selections originated from the Martini family’s Monte Rosso vineyard in Sonoma County.

The Mt. Pisgah vineyard was originally planted in 1885 on a mountainside in the Mayacamas Range overlooking the Valley of the Moon. Riesling was one of the cultivars planted in the 300-acre vineyard. Phylloxera destroyed the original vines at what became known as Goldstein Ranch. The vineyard was restored and fully producing again by the turn of the 20th century. *Peninou, 1998*. The vineyard survived Prohibition because the owner at the time sold his grapes commercially and did not make wine. *Pitcher, 2007*.

Louis Martini purchased the well-respected Mt. Pisgah vineyard in 1936 and renamed it ‘Monte Rosso’ (red mountain). In an oral history interview with UC in 1973, Mr. Martini mentioned that there were quite a few good varieties in the vineyard (including Sémillon, Sylvaner and Folle blanche) when he purchased it, but he did not specifically mention Riesling. Other sources report that Riesling was one of the cultivars on the property. *Pitcher, 2007*. Martini began planting grapes in the Monte Rosso vineyard in 1939, including what he referred to as Johannisberg Riesling. *Martini, L.M., 1973; Sullivan, 1994, 2008*.

In 1951, Dr. Olmo selected Riesling wood from the Monte Rosso vineyard for clonal evaluation trials. That wood

was described as ‘clones 1-25’ from the Monte Rosso vineyard. *Olmo, undated*. In the Olmo files located in Special Collections at UC Davis’ Shields Library, a paper in Olmo’s handwriting dated August 1951 states: ‘Bud selection. L.M. Martini, Monte Rosso. 1-25 White Riesling. Hilltop. Best vines only. Many vines of shot berry type, some flower clusters drying completely and sterile. Some not shedding calyptras.’

Louis Martini had also purchased approximately 200 acres of the Stanly Ranch in the Carneros section of Napa in 1942. *Martini, L.P., 1973*. Olmo conducted ‘progeny’ (clonal) tests on this property for several varieties, most notably Chardonnay. A handwritten map of the Stanly Lane vineyard property was discovered in the Olmo files in Special Collections. The map indicates that Olmo also conducted progeny tests on the White Riesling Monte Rosso clones 1-25 at the Stanly Lane site.

It is clear that **Riesling FPS 28** originated from Martini’s Monte Rosso vineyard. The precise origin of **Riesling FPS 10** was not as well-documented in the FPS records.

The FPS database and old [Austin] Goheen indexing records state definitely that the source vine for **Riesling FPS 28** came to FPS around 1965 from the Martini Stanly Lane vineyard (location r10 v8), the location of the Monte Rosso clonal trials. In fact, a handwritten document in FPS files (‘Foundation candidates’) dated March 9, 1965, indicates that *two clones* were brought to FPS from the ‘Martini vineyard, Napa’—one from location r10 v8 (clone 8) and one possibly from r23 v3 (clone 25). *Olmo, 1965*. The March 1965 paper is significant because it identifies a second Monte Rosso clone coming to FPS at that time.

FPS source information for **Riesling FPS 10** shows that it originated from ‘a’ Martini vineyard around 1965, but does not tie the selection to the Monte Rosso clonal tests. The documents from old Olmo and FPS files show that **Riesling FPS 10** was undoubtedly the second Monte Rosso clone that was brought to FPS from the Stanly Lane property in Napa at the same time as Monte Rosso ‘clone 8’ (**FPS 28**). UCD documents related to clonal trials conducted on the two selections in 1975-1981 state clearly that the source vines for **Riesling FPS 10 and 28** were not the same vine at Stanly Lane. *Alley, 1975*.

Riesling FPS 10 came to FPS around 1965 and was given the name White Riesling FPS 10. Curtis Alley, a UC Davis viticulture specialist and former manager of FPMS, also referred to **Riesling FPS 10** as superclone #107. Source information was likely entered in the White Riesling section of Goheen’s indexing binder as ‘No number’ because the exact source location from Stanly Lane was at issue.

The two Martini Riesling clones were entered together sequentially in the indexing binder and both underwent preliminary index testing at FPS in 1964-65. After preliminary index testing, **Riesling FPS 10** underwent heat treatment for 105 days and was first planted in the foundation vineyard in 1967. The selection first appeared on the list of registered vines in the California Grapevine Registration & Certification Program (R & C Program) in 1970. The name was changed to Riesling FPS 10 in 2003.

Riesling FPS 28 proceeded in a more circuitous route to the foundation vineyard at FPS. Upon its arrival at FPS from the Martini Stanly Lane vineyard around 1965, this selection was assigned the name White Riesling FPS 15. After preliminary index testing, the selection underwent heat treatment for 154 days and was planted in the foundation vineyard in May of 1972. White Riesling FPS 15 first appeared on the list of registered vines in the R&C Program in 1991.

Although this selection never tested positive for virus, White Riesling FPS 15 underwent micro shoot tip tissue culture therapy in 1999. The reason for the therapy is unclear, except that this selection was removed from the list of registered vines after virus was discovered in the foundation vineyard in 1992-1993. In 2008, the tissue culture version of this selection was released as **Riesling FPS 28**, which at this time has Provisional status in the R&C Program.

Riesling FPS 04 came to FPS before 1963 from an unknown source. The initial entry for the selection in the Goheen indexing binder states 'No record of source.' Nothing in the historical library documents or other FPS records contradicts that statement. There is no indication in USDA files that the selection was imported from abroad, so it is most likely a local donation. The plant material was originally given the name White Riesling FPS 04 and received no treatment. The selection first appeared on the list of registered vines in 1971. Its name was changed to **Riesling FPS 04** in 2003.

GERMAN CLONES

FPS has numerous Riesling clones from Germany, the presumed home of the cultivar. The clones come from three areas: the Rheingau, the Mosel region and the Pfalz (Palatinate).

Clonal selection in Germany began in the 19th century. *Rühl et al., 2004*. Called 'systematic preservation breeding of vine varieties', the process included careful individual selection followed by observations and repeated testing on successive clonal descendants. Eventually the method evolved so that the successive A, B and C clone

levels were all subjected to progeny testing. Research stations and private breeders adopted the concept of repetitive selection for high performance in the 1920's. *Rühl et al., 2004; Schöffling and Stellmach, 1996*.

By 2003, 99 grapevine cultivars were officially registered at the federal office Bundessortenamt. Seventy-five of those cultivars were bred during the 20th century. The 99 cultivars included 530 registered clones, of which 86 belong to one cultivar, Riesling. *Jung and Maul, 2004*.

The Institute at Geisenheim

The Rheingau region of Germany is thought of as Riesling's historical and traditional home. Some say the Golden Age of Rheingau Riesling was from 1870 to 1930. The region is a small region (forty miles long by three miles wide) and runs along the Rhine River near Wiesbaden. *Price, 2004*. Today 80% of the vineyards in the Rheingau region are planted with Riesling grapes. *Robinson, 2006*. The International Riesling Foundation reports that many Rheingau Rieslings are made in the dry style and are rich and full-bodied, usually with a pronounced acidity and spiciness to the wines.

In 1872, Prussia established a horticulture and viticulture research institute at Geisenheim (Forschungsanstalt Geisenheim—Geisenheim Research Center) in the heart of what is now the Rhinegau region. *Robinson, 2006*. The Prussian government also initiated grafting improvement measures and clonal selection to improve the health status of grapevines. The institute for grapevine breeding and grafting was later established in 1950 as part of the Geisenheim Research Center. *Rühl, September 2009*.

Clonal selection focusing on White Riesling commenced at Geisenheim in 1921. Selection criteria were based on healthy growth, absence of virus symptoms and performance measures such as consistent yields and high wine quality. One of the goals of the program was to preserve the wide genetic base of the Riesling cultivar. By the end of the 1950's, seven clones were available to growers, including 110Gm (Geisenheim), 198Gm and 239Gm. *Bettiga, 2003; Schmid et al., 1995*. The original clones were tested further and subclones were created and tested, including 239-25Gm.

The virus-tested Geisenheim White Riesling clones and subclones were tested from 1978 to 1993, and regular crops with good sugar and acid levels were produced each year. At that time, virus tests were conducted in the institute's laboratories as well as at INRA's Colmar facility. The researchers concluded that no significant differences could be detected between them in regard to yield, sugar, acid levels and pH, and attributed that result to a generally high selection level. *Schmid et al., 1995*.

Two Riesling selections of German origin thriving in the FPS Foundation Vineyard: left, Riesling FPS 12 and at right, Riesling FPS 23.

Photos by Bev Ferguson



Three Geisenheim Riesling clones are in the FPS public collection: two selections of Geisenheim 110 (110Gm), one selection of Geisenheim 198 (198Gm) and one selection of Geisenheim subclone 239-25 (239-25Gm).

German clone 110Gm is represented in the FPS collection by **Riesling FPS 09** and **Riesling FPS 24**. This clone has an extremely fruity, slightly muscat flavor, and in warmer sites it is regarded as not typical of German Riesling wines. *Bettiga, 2003*.

Riesling FPS 09 was imported to Davis from Geisenheim in 1952 with the notation that it was 'Rhein Riesling klon 110' (USDA Plant Introduction #200886). The selection was initially named White Riesling FPS 03. It underwent heat treatment for 112 days, and FPMS manager Curtis Alley assigned it the alternate designation of superclone #106 (related to the length of the heat treatment therapy). After heat treatment, the selection was renumbered White Riesling FPS 09, which was first planted in the foundation vineyard in 1965 and appeared on the list of registered vines in 1967. The name was changed to **Riesling FPS 09** in 2003. A version of **Riesling FPS 09** that has been subjected to macro shoot tip tissue culture therapy for elimination of *Agrobacterium vitis* is also available.

Riesling FPS 24 was also imported to Davis from Geisenheim in 1952 as 'Rhein Riesling klon 110'. It has the same source as **Riesling FPS 09** and was originally distributed by FPS as White Riesling FPS 03. The original material for this selection tested positive for Rupestris stem pitting. The selection was dropped from the R&C Program in the early 1980's because at that time, RSP positive vines were not allowed. The plant material was maintained at FPS and the name changed in 2003 to **Riesling FPS 03**. In 2007, microshoot tip tissue culture therapy was used to create an RSP-free selection of 110Gm, which was given the name **Riesling FPS 24** in 2008 and recently attained Registered status.

German clone 198Gm is represented in the FPS collection by **Riesling FPS 17**. This clone has lower crop yields with wines of elegant fruitfulness and pronounced

flavor, but with all components in good balance. *Bettiga, 2003*. This clone is ideal for the production of high quality semi-dry wines. Geisenheim clones 198Gm and subclones of 239Gm are recommended for planting in warmer sites. *Schmid et al., 1995*.

Riesling FPS 17 was imported to Davis from Geisenheim in 1952 under the name 'Rhein Riesling klon 198' (USDA PI #200888). The selection was named White Riesling FPS 02 and did not undergo any treatment. It was first planted in the foundation vineyard in 1961 and appeared on the list of registered vines in 1965. The name and number were changed to **Riesling FPS 17** in 2003, and the selection appeared on the list of registered vines that year under that new number. The selection number was changed to 17 because FPS already had a selection named **Riesling FPS 02**. A version of **Riesling FPS 17** that has been subjected to macro shoot tip tissue culture therapy for elimination of *Agrobacterium vitis* is also available.

German clone 239-25Gm is represented in the FPS collection by **Riesling FPS 23**. This versatile clone with its sub-clones is the most widely distributed selection in Germany and produces fruity wines with a wide range of terpenes, resulting in a spectrum of fruitfulness. *Bettiga, 2003; Schmid et al., 1995*.

In the mid-1980's the Oregon Winegrowers' Association and Oregon State University (OSU) collaborated on a project related to a mutual interest in European clonal material. They imported many European clones to Oregon. In response to interest from the California grape and wine industry, OSU agreed in 1987-88 to make some of the clones available for the public collection at FPS.

Riesling FPS 23 was imported from Geisenheim by OSU and then sent to FPS in 1987. OSU received the original material labeled 'Riesling 239-25Gm'. When the selection arrived at FPS, it was designated **Riesling FPS S1**. Tests in the late 1980's detected RSP virus, so the selection was distributed in the 1990's as non-registered, RSP+ **Riesling FPS 02**. [This selection should not be confused with *White Riesling FPS 02*, which was the precursor to **Riesling FPS 17**].

In 2007, Riesling FPS 02 was renamed **Riesling FPS 23**, which had been vegetatively propagated from a cutting of the original source plant. There is no indication in either the FPS database or the FPS tissue culture records that this selection ever underwent microshoot tip tissue culture therapy, although an article in the 2007 FPS Grape Program Newsletter so indicated. It appears that the article was in error. The new selection number was most likely a product of moving the selection from the V&E vineyard location into the FPS foundation vineyard. The new **Riesling FPS 23** planting has tested positive for the RSP virus and has recently attained Registered status.

The Mosel region

The Mosel is portrayed as the quality region for Riesling wine. Traditionally the wines tended to be delicate, lower in alcohol (often 8%), higher in acid, floral and intensely mineral. According to the IRF, the wine is usually made in an off-dry style because of the higher acidity. At the same time, this region has produced excellent botrytized wines because of the long-ripening period allowed by the sheltered river valleys and a favored moist climate to promote botrytis. *Fischer and Swoboda, 2007*. Almost 70% of the grape acreage in the Mosel region is dedicated to Riesling. Steep south-facing vineyards allow it to flourish in this northern area. *Robinson, 2006; Price, 2004*.

The Central Office for Clonal Selection is located in the cities of Trier and Bernkastel-Kues, Germany, in the Mosel region. Dr. Günther Stellmach is associated with that office and, in 1987, was responsible for sending what was then called the 'Riesling 21B' clone to the grape program at Oregon State University. *Winegrowers Project, 1988*. The selection was in turn sent that year from OSU to Foundation Plant Services as part of the Winegrowers' Project and is now known as **Riesling FPS 01**.

German clone 21B was found in the Mosel region in Bernkastel-Kues (the B in the name allegedly refers to Bernkastel). The clone is now known as Weis 21, after the breeder Hermann Weiss. www.urbans-hof.com/mosel-pflanz-service/index.html – in German. When the berries of Weis 21 are smaller, the must density and wine quality increase. *Schöffling and Stellmach, 1996*. A common comment from growers is that the clone is highly productive. The records are not clear whether FPS received the clone in the form in which it now exists or in some prior earlier stage in the clonal development process.

The Riesling 21B clone was initially given the name Riesling 21B S1 at FPS. Sometime prior to 2000, the name was changed to **Riesling FPS 01**. Riesling FPS 01 did not receive any treatment at FPS. It was first planted in the

foundation vineyard in 1990 and appeared on the list of registered vines in the R&C Program in 2000.

The Pfalz (Palatinate)

The Pfalz region in the Palatinate joined the Rheingau and Mosel as great wine region in the middle of the 19th century. The 'southern wine route' (Südlliche Weinstrasse) runs from Neustadt to the French border along the Haardt Mountains. *Price, 2004*. The climate in the region is benign, and Riesling accounts for 20% of the vineyard plantings. *Robinson, 2006*.

Pfalz Riesling typically ripens to over 12 % alcohol and appears to be particularly suitable for vinification to 'completely dry, relatively corpulent' Rieslings. *Robinson, 2006*. Another description of Pfalz Riesling describes them as 'clear, pure wines'. *Robinson, 2006*. The region is also known for its spicy Spätlesen and Auslesen. This spicy character is attributed to one of the German Riesling clones, clone 90, which is unique to the Pfalz.

Neustadt in the Pfalz region is an important center for viticultural and wine research. Clonal development work is done at the Neustadt Research Institute, which is now known as Dienstleistungszentrum Ländlicher Raum Rheinpfalz (known in 1963 as Landes Lehr und Forschungsanstalt at Neustadt). The wine school in Neustadt was established in 1899 by the citizens of Neustadt an der Weinstrasse. The Hessian wine academy at Oppenheim dates from 1885. *Robinson, 2006*.

Two German clones from the Pfalz region are included in the FPS public collection: **Riesling FPS 12** and **Riesling FPS 21**. Both were sent to Davis in May, 1963, from the Neustadt Research Institute.

There is only one Riesling clone that was developed at Neustadt. **Riesling FPS 12** is German clone 90 (also known as N90, for 'Neustadt 90'). Clone 90 was first recognized as a superior clone by German researchers in 1913. Reportedly, years of experimentation proved the clone to be aromatic, cold tolerant and disease resistant. *Alley, 2008*.

This selection arrived in Davis in 1963 (USDA PI #289905) and was initially named White Riesling FPS 12. It received no treatment and was planted in the foundation vineyard at FPS in 1969. White Riesling FPS 12 first appeared on the list of registered vines in the R&C Program in 1970, later renamed **Riesling FPS 12** in 2003. A version of **Riesling FPS 12** that has been subjected to macro shoot tip tissue culture therapy for elimination of *Agrobacterium vitis* is also available.

The second selection imported from the Institute at Neustadt in 1963 was **Riesling FPS 21**. The source of this selection is 'clone 356'. Originally this Riesling clone was called Trautwein 356, indicating selection by a man named Trautwein. When he died, a man named Finkenauer continued selecting the A clones. Finkenauer maintained the number 356 but changed the clonal designation to 356Fin.

According to Matthias Zink, manager of the vine nursery at Neustadt, clone '356 Fin' was previously held at the Institute at Bad Kreuznach; it is now held at the Institute in Oppenheim (Dienstleistungszentrum Ländlicher Raum Rheinpfalz Rheinhessen-Nahe-Hunsrück). Curtis Alley reported that the clone sent to FPS was the clone 356 held at Bad Kreuznach. *Alley, 1977*.

Upon its arrival in Davis, clone 356 was given the name White Riesling FPS 14 and was planted in the foundation block at FPS in 1970. It does not appear on any of the lists of registered selections in the 1970's and 1980's, even though all of the original virus tests were negative. In 1981, White Riesling FPS 14 tested RSP+, which would have disqualified it for the R&C Program at that time. The name was changed to **Riesling FPS 14** in 2003. In 2006, **Riesling FPS 21** was created from **Riesling FPS 14** by use of micro shoot tip tissue culture therapy. The selection now has registered status in the R&C Program.

Private German Selections

There are three proprietary German selections held at FPS on behalf of Vino Ultima, Inc: **Riesling FPS 25, 26, and 27**. These are new subclones of clones 110, 198, 239 contained in the Geisenheim collection. The three selections came to FPS in 2006 and have Provisional status in the R&C Program. Joachim Hollerith comments that 'these are some of the best clones available in Germany and Europe. California grape growers may now access the new Geisenheim clone material from one source'. *Hollerith, August 2008*. A limited amount of grafted vines of these clones will be available in 2010.

FRENCH CLONES

The French region of Alsace, near the German border, claims to be one of the locations where Riesling was born. *Fischer and Swoboda, 2007*. A possible early written reference appeared on a 1348 map in Kintzheim, Alsace, as 'zu dem Russelinge'. *Price, 2004*. The spelling was similar to several cultivars of the time, so no definitive conclusion can be drawn. Riesling was mentioned in writing for the first time during a 1477 visit by Duke René of Lorraine. *Fischer and Swoboda, 2007*. From the 16th century, Riesling became recognized as the finest white grape in Germany, which at the time included Alsace. *Price, 2004*.

There are three selections from France in the FPS public collection: **White Riesling FPS S1**, **Riesling FPS 20** and **Riesling ENTAV-INRA®49**. All three are versions of the same French clone.

White Riesling FPS S1 came to FPS via OSU as part of the Winegrowers Project in 1987. The Winegrowers' Report indicates that White Riesling clone 813 (certified in 1971) was imported from the French government research center in Colmar, the Centre de recherché de Colmar of the Institut national de la recherché agronomique (INRA). At the time it was imported to FPS via OSU, this French clone was known as White Riesling clone 813 from Colmar, Alsace. Alsatian clone 813 has since been re-designated official French clone ENTAV-INRA®49. White Riesling FPS S1 was imported prior to ENTAV-INRA developing licensing and trademark protection for French clone 49. *ENTAV, 1995*.

White Riesling FPS S1 is currently planted in the quarantine vineyard at FPS and is undergoing index testing, results of which should be available in spring of 2010. The selection has tested RSP+ in the past. It will be assigned an FPS selection number when it is advanced in the R&C Program to the foundation vineyard.

Riesling FPS 20 was donated to the FPS public collection in 1999 by Clos Pepe Vineyards in Lompoc, California. The selection is a Riesling clone reportedly from Alsace, France, most likely Alsatian clone 813. The original material tested positive for leafroll virus, so it underwent micro shoot tip tissue culture virus elimination therapy in 2005. **Riesling FPS 20** was planted in the foundation vineyard in 2008 and now appears on the list of registered vines for the R&C Program.

The Etablissement National Technique pour l'Amelioration de la Viticulture (ENTAV) is an official agency certified by the French Ministry of Agriculture and responsible for management and coordination of the French national clonal selection program. ENTAV maintains the French national repository of accredited clones and created an ENTAV-INRA® authorized trademark to identify its official clonal materials internationally. Trademarked importations come directly from official French source vines.

Riesling ENTAV-INRA® 49 is the official French clone for Riesling 49 and came to FPS in 2000. The ENTAV-INRA literature on the clone indicates that when yields are controlled, the wines are very well balanced and very typical. Riesling ENTAV-INRA®49 is a proprietary selection at FPS and is distributed through ENTAV-INRA licensees. The selection appears on the list of registered vines for the R&C Program.

ITALIAN CLONES

Riesling was introduced to Italy in the 19th century, probably from the Rhine Valley in Germany. *Calò et al., 2001*. The best locations for planting in Italy are Trentino Alto Adige, the area above Lago di Garda in the Italian Alps and in Friuli near Slovenia. Riesling is known in Italy as Riesling renano.

There is another grape cultivar in Italy with the name 'Riesling', which is genetically unrelated to the 'true Riesling' (Riesling renano). Riesling Italico (also known as Walsch or Welsch Riesling) has characteristically different morphology and produces distinctly different wine than Riesling renano. *Calò et al., 2001*.

There are two Riesling clones from Italy in the FPS public collection: **Riesling FPS 19** and **Riesling renano FPS S1**. The plant material that eventually became **Riesling FPS 19** was imported directly to FPS from Italy in 1988 as a follow up to the Oregon Winegrowers' Project. The selection came to FPS from Dr. Antonio Calò of the Istituto Sperimentale per la Viticoltura (ISV) in Conegliano, Italy, and was labeled Riesling Italico clone ISV-CPF 100. *Winegrowers Report, 1988*. Apparently 'CPF' stands for 'Centro Potenziamento Friuli' (Improvement Center for Friuli), but there is no Riesling clone (either renano or Italico) in Italy with the number 100.

Once at FPS, the selection was originally assigned the name Riesling Italico FPS S1. A new selection was created from FPS S1 in 2001 using microshoot tip tissue culture therapy, resulting in Riesling Italico FPS 03. Subsequent ampelographic and DNA analysis (2003) at FPS revealed that the FPS 03 plant material was not Riesling Italico but was, in fact, the true Riesling. The name was changed to **Riesling FPS 19** in 2005 to reflect its correct cultivar identification. **Riesling FPS 19** first appeared on the list of registered vines for the R&C Program in 2005.

The second true Riesling from Italy in the public collection is **Riesling renano FPS S1**. This selection was imported directly to FPS in 1988 as part of the Winegrowers' Project. The plant material was supplied by Dr. Calò of the ISV (Conegliano) and was labeled clone ISV 10. *Winegrowers' Report, 1988*. **Riesling renano FPS S1** is planted in a quarantine vineyard at FPS and is currently undergoing index testing. It should be ready for release in spring 2012 if it tests negative for pathogens. When it advances in the program, it will be assigned an FPS selection number under the name Riesling.

A third Riesling clone at FPS is a proprietary clone from Vivai Cooperativi Rauscedo (VCR), clone VCR 3. It is reported that VCR 3 has small clusters and average and uniform berries, with good resistance to botrytis bunch rot. *Calò et al., 2001*. The selection came to FPS in 1998

from Italy and underwent micro shoot tip tissue culture disease elimination therapy in 2003. **Riesling renano FPS 01** is distributed by Novavine Nurseries. Novavine has chosen to retain the name Riesling renano for this selection.

SOUTHERN HEMISPHERE CLONES

Australia

In 1970, Dr. Goheen imported a White Riesling clone from Victoria, Australia. The plant material was sent by R.H. Taylor at the Victorian Plant Research Institute in Burnley, Victoria, and was labeled White Riesling 'Tulloch S.A. 140' (USDA PI # 364292). **Riesling FPS 16** did not receive any treatment and was first planted in the foundation vineyard in 1973. When nearby vines tested positive for virus, the registered FPS 16 vines were put on hold status. The foundation vines for this selection later tested positive for GVA. Meristems have been taken from those vines to begin the process of micro shoot tip tissue culture disease elimination therapy. Index testing on the new tissue culture vines will begin if they survive.

Argentina

Riesling FPS 22 was imported to Davis in August, 1961, from Fernandez-Montero in Mendoza, Argentina, under the name 'Riesling' (USDA PI #277335). The selection was initially assigned the name White Riesling FPS 13 and planted in the foundation vineyard in 1967. The selection does not appear on any of the lists of registered vines in the 1970's and 1980's. White Riesling 13 tested positive for RSP in 1981, which would have disqualified it for the R&C Program at that time. In 2003, the name was changed to Riesling FPS 13. In 2006, **Riesling FPS 22** was created from Riesling FPS 13 by microshoot tip tissue culture therapy. The selection now has registered status in the R&C Program.

CLONAL TRIALS

Not surprisingly, there have been few clonal trials of FPS Riesling selections in California. The climate is suitable for optimal Riesling production in only a limited portion of the state. One major clonal trial occurred in Davis in the late 1970's, and another has only recently begun in the more suitable environment of Monterey County.

Dr. Harold Olmo conducted clonal selection and wine trials on White Riesling from the 1950's through the 1970's. His clonal selection program on the Martini property in Napa did yield selections with different characteristics; two of those selections are in the FPS public collection. *Olmo, 1978*. Details of specific data are absent from the Olmo files and FPS. A clonal test plot containing FPS selections 3, 4, 9 and 10 was planted at Oakville in 1969. The study does not appear to have been published or have reported results.

In 1975, Curtis Alley (UC Davis Department of Viticulture and Enology) began a clonal study in the Davis research vineyard on nine FPS White Riesling selections – FPS 02 (198Gm), FPS 03 (110Gm), FPS 09 (110Gm), FPS10 (Martini, Napa), FPS 11 (Neustadt), FPS 12 (N90, Neustadt), FPS 13 (Argentina), FPS 14 (356, Neustadt), and 15 (Martini, Napa). The plots were made up of 26 single vine replications. They were brought up to vertical cordon by 1977. *Alley, 1977*. Considerable data was noted by Alley on handwritten files between 1978 and 1981, although data for 1977 was considered unreliable due to scale malfunction. *Alley letter to Berti, December 6, 1977*. A summary of four years' data prepared by Alley and A.T. Koyama (dated June, 29, 1982) is available. *Alley and Koyama, 1982*. A progress report submitted to the sponsor of the Riesling trial is also available in the old files. *Alley letter to Berti, 1981*.

The clones were scored on the basis of 'overall viticultural rating' by allowing 10 points (a=10, b=7, c=4, d=1) for crop weight, which was the most important factor; 3 points each for vine vigor and cluster number (a=3, b=2, c=1), and 2 points for cluster size (a=2, b=1). *Alley letter to Berti, 1981*.

After two years of data, no significant differences were noted for fruit production. All clones produced an exceedingly high 10.9-12 tons per acre. No significant differences were observed for mean cluster numbers or size. Clones 13 and 14 showed the most vine vigor (brush weight). The scoring using the viticultural rating system gave the highest rating to clones 2 (198Gm, now Riesling FPS 17) and 11 (a Neustadt clone that is no longer at FPS); intermediate ratings to clones 9 (110Gm), 10 (Martini), 12 (N90), 13 (Argentina, now Riesling FPS 22), and 15 (Martini, now Riesling FPS 28); and the lowest rating to clones 3 (110Gm, now Riesling FPS 24) and 14 (clone 356, now Riesling FPS 21). *Alley letter to Berti, 1981*.

There is an abbreviated summary of data from the complete duration of the trial, 1978-80. *Kasimatis letter to Alley, 1982*. Three years of data was collected and tabulated. The performance of the White Riesling clones did not show definite differences. Four selections from the nine clones were made, based on their differences in yield: high – clones 2 and 11; medium – clone 15; low – clone 13. *Alley and Koyama, 1982*. Yield for clones 2 and 11 was high (9.2 tons and 9.1 tons per acre), for clone 15 was moderate (8.5 tons) and for clone 13 was low (7.0 tons). All clones were similar for vine vigor (10.5-12.8 pounds per vine). Mean cluster numbers per vine were: clone 2 (124.2), clone 11 (125.2), clone 15 (114.5) and clone 13 (106.3). The mean cluster weight for all four clones was .32 pounds. *Kasimatis letter to Alley, 1982*.

Current clonal evaluation in a climate more suitable to Riesling is underway in Monterey County. Dr. Larry Bettiga has developed a trial at a vineyard in the Arroyo Seco appellation of Monterey County to evaluate the following selections: FPS 01, FPS 04, FPS 09, FPS 10, FPS 12, FPS 17, FPS 20, FPS 21, FPS 22, and FPS 23, and ENTAV-INRA@49. Data collection is expected to begin in 2010. The trial will evaluate viticultural differences between the clones. There are also plans with a cooperating winery to make wines from this site.

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Riesling Selections at Foundation Plant Services

(September 2009)

| Name | FPS Selection | FPS Status | Treatment | Source |
|-----------------|-----------------|----------------|--|--|
| Riesling FPS 01 | 0000-0-5674-01 | R | None | Riesling clone 21B (now known as Weis 21), Germany via Oregon State University in 1988 |
| Riesling FPS 04 | 0000-0-345-04 | R | None | Unknown, to FPS around 1963; formerly known as White Riesling FPS 04 |
| Riesling FPS 09 | 0000-0-1341-09 | R; P in Goheen | Heat treatment 112 days for regular vines; macroshoot tissue culture for Goheen vines (tested for <i>Agrobacterium vitis</i>) | Geisenheim clone 110, from Germany in 1952; formerly known as White Riesling FPS 03 and White Riesling FPS 09 |
| Riesling FPS 10 | 0000-0-1343-10 | R | Heat treatment 105 days | Martini Monte Rosso vineyard in Sonoma County via Martini vineyard in Napa County in 1965; formerly known as White Riesling FPS 10 |
| Riesling FPS 12 | 0000-0-1346-12 | R; P in Goheen | None for regular vines; macroshoot tissue culture for Goheen vines (tested for <i>Agrobacterium vitis</i>) | Neustadt clone 90, from Germany in 1963; formerly known as White Riesling FPS 12 |
| Riesling FPS 16 | 1970-0-1350-16 | N | Currently undergoing microshoot tip tissue culture therapy | Victorian Plant Research Institute in Burnley, Victoria in 1970; registered foundation vines are on HOLD status; tissue culture therapy in progress on plant material from registered vines |
| Riesling FPS 17 | 0000-0-7690-17 | R; P in Goheen | None for regular vines; macro shoot tissue culture for Goheen vines (tested for <i>Agrobacterium vitis</i>) | Geisenheim clone 198, from Germany in 1952; formerly known as White Riesling FPS 02 |
| Riesling FPS 19 | 1988-0-8033-19 | R | Microshoot tip tissue culture | Instituto Sperimentale per la Viticoltura, Conegliano, Italy, in 1988; initially misidentified as Riesling Italicco FPS 03; DNA analysis (2003) showed that this selection is Riesling weiss |
| Riesling FPS 20 | 1999-15-7995-20 | R | Microshoot tip tissue culture | Alsace, France via Clos Pepe Vineyards, Lompoc, California 1999 |
| Riesling FPS 21 | 1963-0-8172-21 | R | Microshoot tip tissue culture from FPS 14 | German clone 356Fin (formerly Trautwein 356) from Neustadt, Germany in 1963; formerly White Riesling FPS 14 and Riesling FPS 14; underwent tissue culture therapy in 2006 because Riesling FPS 14 was RSP+ |

*Proprietary selections are indicated in boldface type

*FPS Status: R=Registered; P=Provisional (awaiting professional identification); N and Q=in the Pipeline at FPS

Riesling Selections at Foundation Plant Services (cont.)

| Name | FPS Selection | FPS Status | Treatment | Source |
|-------------------------------|-----------------|------------|---|--|
| Riesling FPS 23 | 1987-0-8346-23 | R | None, RSP+ | Geisenheim clone 239-25, from Germany via Oregon State University in 1987; formerly known as Riesling FPS 02 |
| Riesling FPS 24 | 0000-0-8394-24 | R | Microshoot tip tissue culture from White Riesling FPS 03 | Geisenheim clone 110, from Germany in 1952; formerly known as White Riesling FPS 03 and White Riesling FPS 24; underwent tissue culture therapy in 2007 to eliminate RSP virus |
| Riesling FPS 25 | 2006-14-8118-25 | P | | Proprietary subclone (clone 110) from Geisenheim Germany for Vino Ultima |
| Riesling FPS 26 | 2006-14-8119-26 | P | | Proprietary subclone (clone 198) from Geisenheim Germany for Vino Ultima |
| Riesling FPS 27 | 2006-14-8120-27 | P | | Proprietary clone (clone 239) from Geisenheim for Vino Ultima |
| Riesling FPS 28 | 0000-0-8543-28 | P | Heat treatment 154 days; microshoot tip tissue culture from White Riesling FPS 15 | Martini Monte Rosso vineyard in Sonoma County via Martini vineyard in Napa in 1965; formerly known as White Riesling FPS 15; underwent tissue culture therapy in 2008 |
| Riesling ENTAV-INRA®49 | 2000-7-7790-49 | R | None | Authorized ENTAV-INRA® clone 49 from France; to FPS in 2000; proprietary to ENTAV licensees |
| Riesling renano FPS 01 | 1998-7-7359-01 | P | Microshoot tip tissue culture | Vivai Cooperativi Rauscedo clone 3, from Italy in 1998; proprietary to Novavine Nurseries |
| Riesling renano FPS S1 | 1988-0-2661-S1 | Q | Currently undergoing microshoot tip tissue culture therapy | Clone 10 from Istituto Sperimentale per la Viticoltura, from Conegliano, Italy in 1988; estimated release is Spring 2012 |
| White Riesling FPS S1 | 1987-0-2613-S1 | N | Currently undergoing index testing; RSP+ | Reported to be Alsatian White Riesling clone 813 from Colmar, France via Oregon State University in 1987; precursor to French clone 49; earliest availability in Spring 2010 |

*Proprietary selections are indicated in boldface type

*FPS Status: R=Registered; P=Provisional (awaiting professional identification); N and Q=in the Pipeline at FPS