

Vine Selection and Clones

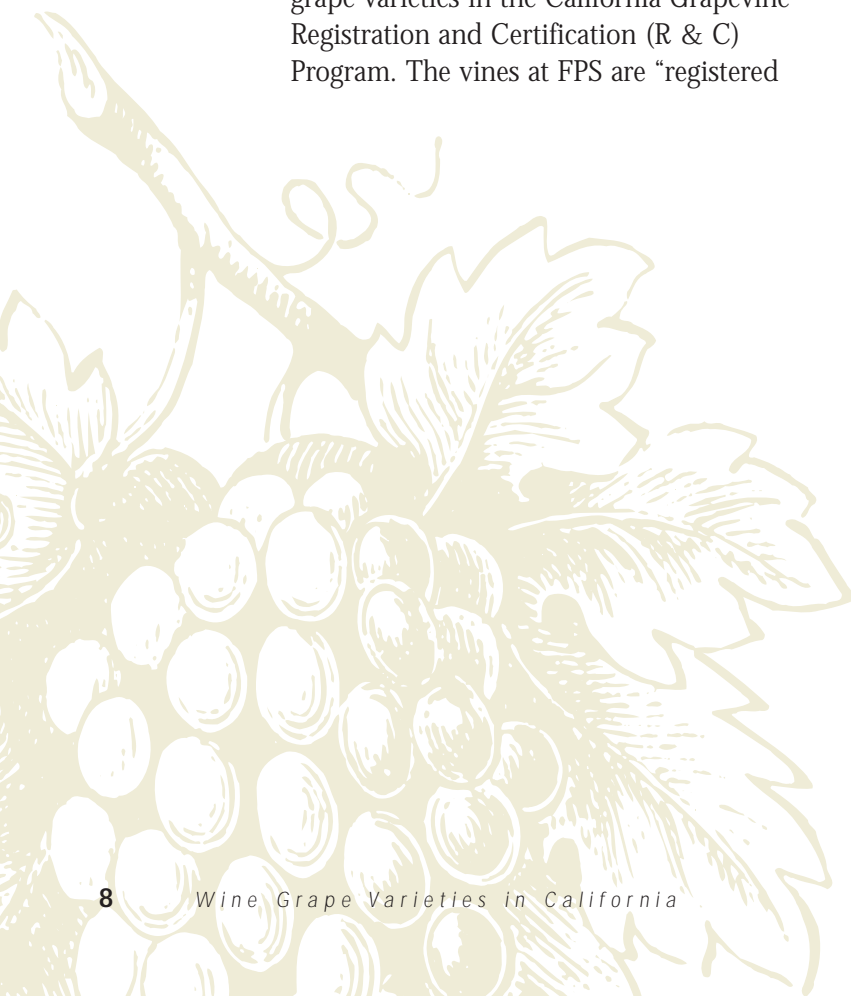
During the 1930s and 1940s, it became clear that virus diseases were reducing the productivity and quality of some vineyards in California. In addition, many commercially available grapevine selections were mislabeled or incorrectly identified. By 1952, Harold Olmo led the formation of the California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

This program is now known as Foundation Plant Services (FPS). It is the home of the Foundation Vineyard, the source of grape varieties in the California Grapevine Registration and Certification (R & C) Program. The vines at FPS are “registered

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

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

Today, with increasingly diverse plant materials available, growers planting new vineyards need to consider choice of clone



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

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

The same clone can be introduced more than once to FPS; each introduction receives a unique selection number to preserve its identity. In addition, sub-clones that have been produced by heat treatment or tissue-culture virus-elimination therapy also receive unique numbers. This has led to a sometimes bewildering accumulation of selection and clone numbers for plant materials that may not differ significantly in performance. This is even further complicated by the existence of European clones that have reached California through other importation centers and may be named according to a number of different conventions.

An additional complication results from the intellectual property issues that have developed around wine grape clones. Some clones are





trademarked and/or proprietary while others are in the public domain. For example, FPS has public or “generic” selections of many of the ENTAV clones in the Foundation Vineyard collection that are known as “Reported to be French” with an ENTAV-assigned clone number as well as an FPS selection number. More than one FPS selection may be available from the same French clone, due to independent import and subcloning. These selections have no assurance of authenticity. However, clones that have come directly from ENTAV are part of a trademark program and are known as “ENTAV-INRA[®].” Not all of these trademarked ENTAV-INRA[®] clones are California certified; some have origins independent of the FPS program.

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

Clone choice is only one of many important decisions when establishing a vineyard.

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

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

A clone selected in another country is not necessarily superior to what is available locally. Clones from regions known for fine wine, particularly Burgundy and Bordeaux, are highly sought after. However, the selection criteria must be explicitly understood to ascertain whether clones selected abroad have value in California. Climates abroad can differ dramatically from California's. Some wine regions have strict yield limits, often made possible by the high bottle prices their wines command. Thus, "good" clones in those regions are those that perform well under specific environmental and economic conditions, neither of which may apply to California. Before making a significant investment in clones selected in another country, growers should verify the performance of those clones under their local conditions.

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

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

First, many varieties contribute significantly to the state's wine economy. In other countries, regions can concentrate on relatively few varieties of importance. Even for "niche" varieties with

small acreage such as Malbec, Viognier, Sangiovese, or Tempranillo, clonal performance is a significant issue because a new variety will not be accepted if the principal clone in use performs poorly.

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

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

—Deborah A. Golino and James A. Wolpert

