

The Best Parents in Breeding French Hybrid Grapes

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The establishment of a number of French hybrid grape varieties and the use of some of these in grape breeding at various experiment stations has caused an interest in their genetic background and certain breeding aspects. Among those features which are of interest to breeders and other students of the grape is the apparent breeding value of certain clones for use as parents in further crossing. Unfortunately, there is a general lack of information about the selections or varieties in this large group of grape varieties that have been good parents in the production of valuable offspring. It has been shown by other workers that certain grape varieties produce a higher percentage of meritorious seedlings when used as parents than do other varieties. This principle has been confirmed with other fruit bearing plants as well, and there is no reason to assume that the French hybrid grapes are exceptions.

In this country the data used to determine the best parents have been obtained largely from breeding work and progeny evaluations performed in the various public supported experiment stations, and the results published in various scientific journals.

One of the most satisfactory and simple methods of expressing the ability of a given clone to transmit desirable qualities to its offspring has been to determine the number of meritorious seedling selections out of the total of any given progeny having the given clone as one of its parents. In determining the meritorious seedlings of a progeny, the figures are normally derived from those seedlings

selected for further observation or test at the first evaluation. This figure is usually expressed as a percentage of the total, and may well be considered as the breeding value of that parent in a particular cross. Thus, with a numerical value assigned to each parent-progeny, direct comparisons can be made between values for different parent-progenies or between progenies having a common or recurring parent.

With the French hybrids, a different set of conditions has occurred in their evolution which alters the problem. This group of hybrid grapes was bred and developed largely by private breeders in France, not by public supported experiment stations. A large number of individual breeders have made a contribution to this work at various times during the last three-quarters of a century, but very little or no data have been published on this particular phase of the breeding work. Several specialized journals devoted to the direct producers (French hybrids) have been published in France at various times, and the literature on these hybrids is extensive; but to the author's knowledge no systematic evaluation of varieties has been made as to their breeding value.

Fortunately the specific parentage is known for the majority of the French hybrids save a few in which (1) the male parent is unknown; (2) the parents are given only as a species without noting specific clones; and (3) the originator does not divulge the specific parentage to the public. In these last cases, resort must be made to botanical analyses of morphological characters

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of the clone in question and its seedlings, plus its breeding behavior and peculiarities in test progenies.

With the lack of comparable data for progeny totals and number of selections per progeny for the French hybrids, which could be used to compute a breeding value for any particular clone, recourse must be made to other methods. It is proposed that part or all of at least the following two points be taken into consideration in establishing the best parents: (1) Clones which have been used in further breeding and have produced meritorious offspring; (2) number of known seedlings selected or placed in commercial test.

It should be noted that this proposal does not mean to imply that other factors should be excluded from consideration, or that these points are necessarily listed in order of relative importance. Indeed, this technique is open to criticism for more than one reason. It is not possible to assign precise numerical values to a parent-progeny, and the information on parentage and offspring was assembled from a large number of sources, some of which are not in agreement. Also, as was pointed out earlier, the fact that the parentage of a few varieties has not been divulged by the originator, and that parentage can only be estimated, is another objection. Despite this, every effort was made to study this problem in detail. The author's conclusions are offered only as one point of view, in an attempt at solving a problem of interest to other breeders.

To appreciate the extremely difficult breeding problems which confronted the French grape breeders, a brief idea of their objectives is helpful. As originally conceived, these objectives were to develop grapes with the wine quality and production capacity of the vinifera wine grapes of France,

and resistance to all of the serious fungus diseases attacking those wine grapes, as well as resistance to the root louse, phylloxera. In practical vineyard terms, this meant developing wine grapes which would not have to be sprayed to control downy mildew and would not have to be grafted in order to be grown in soils infested with phylloxera (i.e. a direct producer).

As one studies the literature and genealogy of the French hybrids from the beginning until the present day, a definite pattern of evolution presents itself. Certain stages have occurred in their breeding and development which are unusual in fruit bearing plants for both length of time that they have been under intensive breeding, and the remarkable continuity of purpose shared by the various independent breeders. While there is some overlapping of these various stages in time, and whereas few individual breeders have carried out their breeding work long enough to span all these stages, there is a close similarity of technique among contemporaries at any given period.

The stages that are recognizable up to the present time are four in number, and can be designated as follows:

Stage I—Primary crosses or F_1 's

Stage II—Secondary crosses or F_2 backcrosses

Stage III—Intercrosses

Stage IV—Modern hybrid x vinifera crosses

It is obvious that no single clone or parent could be superior throughout the entire period of time, because each succeeding generation should, in theory and practice, be an improvement over the ancestral varieties. Accordingly, as the work progressed from stage to stage, a new group of parents was used; and out of each group certain clones appear as the best parents.

From the large number of crosses made and seedlings grown for selection and further breeding a relatively few exhibit not only superior characteristics in themselves, but, more important, have the ability to transmit these superior characteristics to their offspring to a greater degree than the others.

Stage I—The Primary F₁ Crosses

This stage is in many respects the most important of all, because of its influence on the character of succeeding generations. Although several grape species were available which had high resistance to downy mildew, all did not have equally high resistance to other diseases such as powdery mildew, anthracnose, etc., or to phylloxera. Some, otherwise of promise, had certain objectionable fruit qualities or other defects and were eliminated as suitable parental material after trial.

A wide choice of vinifera varieties, all susceptible to phylloxera and downy mildew, was available for breeding; and the choice of parents for this group of parent material un-

doubtedly involved an element of personal preference to some degree. Wine type vinifera varieties were chosen because wine types and not table grapes were desired. Two general classes of wine type viniferas were available, (1) the local or common wine varieties with relatively good production and cultural features, but of ordinary quality, and (2) the classical or fine wine varieties of high quality, but with relatively low production and less certain cultural values.

In the beginning, a large number of grape species, rootstock selections, vinifera varieties and even American cultivated varieties were employed as parents in the breeding work with various degrees of success. Most of the American varieties used were attenuated hybrids of labrusca, vinifera and, to a lesser extent, riparia, as well as pure labrusca selections. But, with their "foxiness", susceptibility to disease and phylloxera and other undesirable traits, most of these varieties were soon eliminated as parents. Only a very few in this group had sufficient merit to produce offspring of any promise at all. These were Noah, a

TABLE 1.

| <i>Best parents</i> | <i>Progeny used in further breeding or as a commercial variety</i> |
|---------------------------------------|--|
| Jaeger 70 | Aramon X Rupestris Ganzin 1 = Aramon X Rupestris Ganzin |
| Rupestris Ganzin | Aramon X Rupestris Ganzin 4 = Aramon X Rupestris Ganzin |
| Unknown <i>V. rupestris</i> | Aramon X Rupestris Ganzin, 60 = Aramon X Rupestris Ganzin |
| Herbemont Touzan | Couderc 28-112 = Emily X Unknown <i>V. rupestris</i> |
| Aramon | Couderc 71-20 = Jaeger 70 X Unknown <i>V. vinifera</i> |
| Emily | Seibel 29 = Jaeger 70 X Unknown <i>V. vinifera</i> |
| Unknown <i>V. vinifera</i> | Seibel 1000 = Jaeger 70 X Unknown <i>V. vinifera</i> |
| | Seibel 2003 = Jaeger 70 X Herbemont Touzan |
| | Seibel 2007 = Jaeger 70 X Aramon |

riparia-labrusca hybrid, Herbemont plus its close relative Jacques, and seedlings such as Herbemont d'Aurailles, Herbemont Touzan, etc.

Grapes of the Herbemont group are not "foxy" as is Noah, and are referred to as *V. Bourquiniana* varieties in this country. In France, however, they are regarded as complex *aestivalis-cinerea-vinifera* hybrids. Except for this latter group, it is likely that the only reason Noah and a few other labrusca hybrids such as Othello were used as parents was because they were the only grapes then available that had size and production qualities along with a measurable resistance to disease and phylloxera. The other species available had much higher qualities of resistance but small sized fruit. This "short-cut" to achieve berry size later proved to be a costly error, for the "foxiness" introduced in the breeding lines from these labrusca types required several generations of careful selection to diminish its intensity.

Several grape species possessed the necessary high resistance to disease and phylloxera, but not all were suitable for breeding because of certain other characteristics. Some would not mature fruit or wood satisfactorily except in southern France. Others had peculiar flavors which, although not "foxy" as in the labrusca types, were disagreeable when fermented for wine.

Many rootstock varieties were also used because of high phylloxera resistance, vigor, etc. These were chiefly selected clones of either resistant species or of inter-specific hybrids. A few, such as Aramon x *Rupestris* Ganzin-1, were rootstock selections having a vinifera variety as one of the parents. Also used was a species hybrid of American origin which was produced by an American breeder, H. Jaeger, for use as a wine grape. This selection, Jaeger-70, was a *lincecumi-rupestris*

hybrid of good size and quality for a grape without vinifera ancestry; and it ultimately proved to be one of the outstanding first stage parents among the French hybrids. It is found in the lineage of virtually all present day French hybrids at least once, and usually several times; and may be justly considered as the foundation variety of this race of grapes.

Aside from Jaeger-70, which is in itself a *rupestris* hybrid, it is *V. rupestris* more than any other species which was used as the source of resistance to both phylloxera and the fungus diseases. The vinifera varieties used as parents were chiefly the local or common wine types such as Aramon, Alicante Bouschet, Bourrisquou, Columbeau, Carignan and the like, and to a lesser extent the fine wine varieties such as the various Pinot and Gamay types. A summary of the best parents in Stage I is presented in Table 1.

It should be noted that *Rupestris* Ganzin is a *V. rupestris* rootstock selection made by Victor Ganzin, of Toulon, France, and that Emily was a pure vinifera variety produced by Peter Raabe of Philadelphia, Pennsylvania. (*To be continued.*)



Hardiness of Red Raspberries

The variety Sumner, recently introduced by the Washington Agricultural Experiment Station, was the only variety not injured by low winter temperatures at Prosser Washington during 1955. The varieties Washington and Willamette were injured badly, and Puyallup, Newburgh, Latham, Early Red and Canby were killed back to the ground.

At Vancouver, Washington, the varieties Sumner, Canby showed the most resistance to damage from the November freeze in 1955.