The Best Parents in Breeding French Hybrid Grapes

(PART II)

H. C. BARRETT*
Urbana, Illinois

Stage II—The Secondary or F_2 Backcrosses

Most of the large number of F_1 seedling selections were eliminated after trials because of low production, insufficient wine quality and small-sized fruit which made harvesting slow and expensive. Only a few F_1's were sufficiently promising to enjoy a period of popularity as commercial varieties. Of these few, the majority were the tri-hybrids derived from Jaeger 70 *(lincecumii* X *rupestris)* X *vinifera,* because they possessed the size and production characters of *vinifera* to a greater degree than the bi-hybrids of *vinifera* X *rupestris* lineage. Despite this it became evident that even the best F_1's were not good enough to solve the problem adequately, and more *vinifera* fruit characters would have to be introduced or intensified in the next generation.

The realization that more of the desirable *vinifera* characters would have to be incorporated in the next generation if fruit quality was to be improved brought a crucial problem before the breeders. The F_1's were intermediate in resistance to phylloxera and most of them could not long survive as ungrafted plants in soils highly favorable to this insect. On the one hand, more *vinifera* characters were needed to increase the fruit quality and production of the F_1's, while on the other hand, the phylloxera resistance of the species parent was needed to increase the insufficient phylloxera resistance of the F_1's. At the very minimum no further decrease in resistance could be absorbed by the addition of more *vinifera* parentage and still meet the original concept of the direct producer.

The French breeders soon realized that the original concept of the problem would have to be modified and the breeding effort concentrated on one of the two objectives, either disease resistance or phylloxera resistance, if any one of these problems were to be solved in enough time to aid a desperate industry. Grapes could be sprayed for the fungus diseases and grafted to avert phylloxera injury, but of these two preventive measures, spraying was more expensive, far less satisfactory as a control measure, and on susceptible *vinifera* varieties required a large number of applications each year if any crop was to be harvested. Once a vine susceptible to phylloxera attack was grafted on a resistant rootstock, no further attention or expense was involved from phylloxera.

At this stage the emphasis on the breeding work was placed almost entirely on disease resistance, chiefly downy mildew resistance, and phylloxera resistance was temporarily relegated to the background. Backcrossing to the susceptible *vinifera* varieties definitely lowered the mildew resistance, while the fruit qualities of the *vinifera* parent were greatly accentuated. Very few of these ¾ *vinifera* hybrids were resistant enough to mildew to enjoy commercial usage, but their factor for quality and size plus a measurable mildew resistance proved

*Assistant Professor of Plant Breeding, Dept. of Horticulture, University of Illinois.

very useful in the intercrosses to follow in the next stage of breeding. Stage II may be summarized as follows:

TABLE 2.

Best parents	*Progeny used in further breeding or as a commercial variety*
Aramon X Rupestris Ganzin 4	
Aramon X Rupestris Ganzin 60	Clairette dorce Ganzin = Aramon X Rupestris Ganzin 60 X Grosse Clairette
Couderc 28–112	Seibel 14 = (Jaeger 70 X Unknown Vinifera) X Unknown vinifera
Seibel 29	Seibel 752 = Sicilien X Clairette dorce Ganzin
Alicante Bouschet	Seibel 2510 = Alicante Ganzin X Picquepoul
Danugue	Seibel 2653 = Couderc 28–112 X Dattier
Dattier	Seibel 4643 = Seibel 29 X Danugue
Grosse Clairette	
Unknown vinifera	

Alicante Bouschet, Danugue, Dattier, Grosse Clairette, Picquipoul, and Sicilien are pure *vinifera* varieties. Seibel 752 and 2510 are actually 7/8 *vinifera* and F_3 backcrosses, because they have the genetic constitution *((vinifera* x *rupestris)* x *vinifera)* x *vinifera.*

Stage III—Intercrosses

This stage—the longest carried on in point of time, the most intensive with respect to numbers of parents, crosses, and seedlings raised—is the stage of the breeding work in which most of the breeders, past and present, have made their contributions. This stage may be regarded as the most important in its effect on the grape industry of France and in the achievement in a large measure of the breeding objectives set forth in the early 1880's. The objective of high phylloxera resistance was only partially or imperfectly solved, and while many of these hybrids could be grown ungrafted on soils relatively unfavorable to phylloxera, only a few approached the ideal direct producer and were able to grow ungrafted on strongly phylloxerated soils. Incorporation of downy mildew resistance into these hybrids progressed to such a degree that most modern day hybrids are able to produce an economic crop without spraying under ordinary weather conditions. It should be noted that, in actual practice, a spray is given as a precaution if weather conditions are exceptionally favorable for mildew, or to insure a wine with the maximum degree of alcohol content should autumn mildew infections decrease the efficiency of the leaves in producing fruit with a high sugar content.

The F_2 backcross varieties were crossed with the F_1 selections; the F_1's were crossed with each other; and the resulting seedlings were further crossed among themselves until the parentage became a very complex genealogy in which many of the early foundation clones such as Jaeger 70, Aramon X Rupestris Ganzin 1, etc., were found several times as an ancestor in a given

hybrid. Very little "outside blood" was introduced into the lines during this long continued stage, and in this respect it strongly resembled the close type of breeding with restricted blood lines used so successfully by animal breeders in developing the various breeds of cattle and other domestic livestock.

These intercrosses can be looked upon as the segregating generations of a wide range of characters, desirable as well as undesirable; and recombinations appeared which gave a wide variety of aberrant or variable seedlings for selection. The choice of parentage, in so far as the records would indicate, appears to have been more or less haphazard in the beginning, and with varying results. Gradually the clones which gave rise to seedlings with the most desirable fruit and wine qualities, increased resistance, etc. began to appear. These best parental types were then used with greater frequency until at the present time six hybrids, all produced by A. Seibel, account for the parentage of the majority of the best and most widely utilized modern day hybrids. These six varieties are Seibel Nos. 880, 5163, 5455, 6468, 6905, and 7053 of which two, Seibel Nos. 5455 and 7053, are widely grown and appreciated at the present. These varieties, their parentage and the present day hybrids in which these six are represented as one of the immediate parents, are tabulated in Table 3. The parentage of all Seyve-Villard hybrids has not been made public by the originator and the parents listed for them are estimations, in part by Galibert*, and in part by the author using botanical analyses and breeding behavior observations.

Stage IV—Modern Hybrid X Vinifera Crosses

This stage, the most recent in point of time, began largely after the complex intercross hybrids had been improved to a high degree in disease resistance and fruit qualities. Many of these modern hybrid x *vinifera* crosses are virtually indistinguishable from pure *vinifera* varieties in fruit characters, especially those derived from *vinifera* table type parentage. This stage is especially notable for the use of *vinifera* table varieties as parents to produce table type grapes. Prior to this only a very few *vinifera* table varieties were used as parents in breeding, and consequently only a few strictly table or dessert types were produced, most of these probably unintentionally. With an increasing demand for table grapes the breeders have responded with several interesting varieties.

Their resistance to phylloxera and downy mildew undoubtedly is not equal to the better complex hybrids because of the proportion of *vinifera* ancestry, but it is considerably better than that of their *vinifera* parents. Not all of these hybrids are offspring of *vinifera* table varieties, for several of the fine wine varieties of *vinifera* have been also used with promising results. A few of these wine type hybrids, especially Ravat 6, have shown that their wine qualities are the equal of the best *vinifera* wine varieties in many competitions. Stage IV should perhaps be looked upon as concurrent with and supplemental to Stage III and not necessarily as a successor. If past history is a significant indication, then Stage IV is the beginning phase of another cycle of adding more *vinifera*-like qualities to this race of grapes, very analogous to Stage II. The major difference between them is that, in general, the level of both resistance and quality is higher in the non-*vinifera* parents used in Stage IV than

*Galibert, A., 1946. Monographie des Hybrides Producteurs et Porte-Greffes.

TABLE 3.

Best parent	*Parentage*	*Remarks*	*Commercial varieties having this clone as one of its parents*
Seibel 880	C.28–112 X S.2003		Seibel Nos. 7052, 7053, 8712, 8716, 8718, 8745, 8748, 9249, etc.
Seibel 5163	S.2510 X Gaillard 2	Gaillard 2 = (Rup-Othello) X Noah	Seibel Nos. 6086, 7052, 7053, 7162, 7226, 8616, 8712, 8716, 8718, 8745, 8748, 8916, 9045, 9249, 10076, 10096, 10868, 10878, 11342, etc.; various Burdin Nos.
Seibel 5455	S.4461 X Berl. Jacquez	S.4461 = Clairette dorce Ganzin X S.2003	Seibel Nos. 7157, 7162, 8355, 8357, 9110, 10076, 10096, 10173, 13663, 13666, 13669, 13680, 13694, 13695, 14117, 14164, 14189, 14404, 14596, 14638, 14639, 15051, etc.; Landot Nos. 244, 2281, 2282, 2283, 2291, 3381; various Burdin Nos.
Seibel 6468	S.4614 X S.30 11	S.4614 = S.752 X S.2003-Berl. S.3011 = C.28–112 X Dattier	Seibel Nos. 13663, 13666, 13669, 13680, 13694, 13695, 14164, 14189, 14514, 14596, 14638, 14639, 14994, 15062, etc.; Joannes-Seyve Nos. 9149, 11–369, 14–924, 15–875, 14–982, 16–150, 23–284, 24–610, 24–614, 25–874, etc.; Seyve-Villard Nos. 12–303, 12–308, 12–309, 12–327, 12–328, 12–331, 12–347, 12–358, 12–364, 12–375, 12–390, 12–395, 12–397, 12–401, 12–413, 12–417, etc.
Seibel 6905	S.4595 X S.4199	S.4595 = S.452 X S.405 S.452 = Alicante Ganzin X S.1 S.405 = S.14 X Aramon X Rupestris Ganzin 1 S.4199 = S.85 X Couderc 132–11 S.85 = S.2 X Aramon X Rupestris Ganzin 1 C.132–11 = Vinifera X Rupestris parentage	Bertille-Seyve Nos. 4825, 5563; Galibert Nos. 114–10, 114–12, 115–22, 115–24, etc.; Seyve-Villard Nos. 12–303, 12–308, 12–309, 12–327, 12–328, 12–331, 12–347, 12–358, 12–364, 12–375, 12–390, 12–395, 12–397, 12–401, 12–413, 12–417, etc.; various Burdin Nos.; Joannes-Seyve No. 16–150
Seibel 7053	S.5163 X S.880		Joannes-Seyve Nos. 11–369, 15–875, 23–284, 23–416, 24–397, 24–610, 24–614, 26–205, etc.; various Perbos Nos.; Seyve-Villard Nos. 18–283, 18–315, 23–18, 23–501, etc.

TABLE 4.

Parent	*Meritorious progeny used as commercial varieties*
Seibel 8724	Ravat 6 = S. 8724 X Pinot Chardonnay
Seibel 11803	Landot 2832 = S. 11803 X Muscat Hamburg
Seyve-Villard 12–375	Galibert 255–10 = S. V. 12–375 X Muscat Hamburg
Muscat Hamburg	Galibert 256–28 = S.V. 12–375 X Muscat Hamburg
Pinot Chardonnay	Galibert 261–13 = S.V. 12–375 X Semillon
Semillon	Seyve-Villard 20–365 = S.V. 12–375 X Unknown vinifera

those used in Stage II. The best parents that have appeared thus far in Stage IV are listed in Table 4.

There are many other varieties in this category such as Galibert numbers 221–31, 221–32, 238–35, 238–36, 261–11, 261–12, 255–43, 255–99; Seyve-Villard numbers 20–347, 20–366, 20–473; Landot numbers 2843, 2860, etc.; Ravat 262 and many other Ravat nos.; most of the Burdin numbers; Seibel 16281, etc.; all of these hybrid x *vinifera* crosses.

New Minnesota Introductions

Several new fruit varieties were introduced in 1958 by the University of Minnesota. They have been described as follows:

Welcome gooseberry: A seedling of Poorman. Medium-sized, dull-red fruit with pink flesh and few small seeds. The almost thornless plants are vigorous, productive, and relatively free from disease.

Centennial apple-crab: A seedling of Dolgo x Wealthy. Ripening in late-August or early September, its fruit is dark yellow with bright to dark red stripes; has excellent eating quality, and is one of the best for canned sauce and jelly. Tree is small to medium in size, compact, hardy, productive, but biennial. Flowers are large, white and showy.

Northland apple crab: A cross of McIntosh x Dolgo crab. Earlier than Centennial, the fruit is small, solid bright red with purplish bloom. Flavor of its dark yellow flesh is quite good for a crab, fine for sauce, jelly and pickling. Tree is medium-sized, hardy, productive and tends to be biennial.

Solana Strawberry

Tests in southern California since 1953 have shown that the strawberry variety Solana appears well adapted to that area of the state. It is vigorous and a prolific runner maker. The fruit is medium to large, bright red, moderately firm, with good dessert quality, and holds up well in storage without darkening. Solana is highly susceptible to verticillium wilt, but more resistant to mildew and cyclamen mite than Lassen. Although not as heavy a producer or as early as Lassen, it may be a successful variety in both commercial and home plantings in southern California because of its superior fruit quality.