Hybridization of *Euvitis* × *Vitis rotundifolia*: Backcrosses to Muscadine

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For almost a century the hope of hybridizing species of *Euvitis* with *V. rotundifolia* remained unfulfilled. A new type of vine, combining the vigor and disease resistance of the muscadines with the fruit quality of the *vinifera*, should make it possible to grow true "table" grapes in the humid Southeast. Attempts initiated by Wyile (9) came to naught in the chaos following the Civil War, and later efforts, both by private and institutional workers, produced prior to 1955 little beyond the highly sterile *F*₁ generation.

Earlier investigators, notably Dearing (1), Dermer (2), and Patel and Olmo (7), encountered considerable variation in the behavior of individual vines, indicating greater or lesser degree of compatibility in certain combinations and total lack of it in others. Their work, then, points up the existence of a measure of affinity between the bunch grapes and the muscadines, even while disclosing the acute disharmonies existing between them.

The appearance of an ovule-fertile hybrid vine with *Euvitis* type clusters, and the subsequent production of other backcrosses to *Euvitis* capable of normal fruiting have been reported previously (3, 4). This paper describes a new backcross progeny to *V. rotundifolia*.

**Materials**

DRX-55, one of the fertile backcross hybrids previously reported (4), was pollinated by a perfect-flowered *V. rotundifolia* selection, Georgia Station 14-20, outstanding for its large cluster and berry size. Fruit of both parents is light colored,—the seed parent pale yellow and the pollen parent bronze to rose. From this cross some 110 seedlings were obtained in 1960 and transplanted to the test row.

**Results and Discussion**

The BC₃ hybrid, DRX-55, whose pollen parent was presumably a bunch grape, has regained chromosome stability with the normal *Euvitis* complement of 38. When backcrossed to *V. rotundifolia*, (chromosome number 2n = 40), its progeny, 3₅ muscadine, would be expected to show the same chromosome number as the *F*₁ hybrids, (2n = 39), and like them to be highly, it not totally, sterile. Comparison of the degree of sterility in the *F*₁ and BC₃ might throw added light upon the nature of the species barrier and the extent of compatibility between *Euvitis* and *V. rotundifolia*. Occurrence of fertile seedlings of this cross would also confirm the hybridity of the seed parent, for if DRX-55 were not a true hybrid,

Of the 110 seedlings 35 have blossomed to date, the ratio of females to perfect-flowered vines being 1-7. This ratio, slightly below that experienced by Hedrick (5) and Oberle (6), is likely due to the unique floral behavior of the seed parent previously described (4). Blossom period falls roughly between that of the parents, barely overlapping that of the latest bunch grapes, but running well into that of the muscadines. Selfing and germination tests, as well as microscopic examination on random vines, indicate the pollen to be highly defective. Controlled pollination both by bunch grape and
fruited varieties has not, as far as we know, been hitherto reported for *Vitis*, although similar cases of inheritance of color are known in other plants (8).

The fact that these vines are progeny of the widest cross possible within *Vitis* may provide some clues to their abnormal behavior. Their dark fruit color suggests an atavism similar to that found in inheritance of flower color in sweet peas (8). While neither parent carries the factor for normal dark pigment, the seed parent, itself a “wide” hybrid, may carry some ancestral factor for a chromogen, and the *rotundifolia* pollen parent may carry the “activator” factor, *these two factors being complementary*. The male parent shows some slight factor for “blended” pigment, rose bronze, very likely dominant to white, but recessive to dark, which may well be sufficient to initiate the reaction producing dark pigment. On the other hand, this anomaly may arise out of discord between *rotundifolia* genes and *Euculis* cytoplasm.

DRX-55 crossed with light-fruited *Euculis* varieties, has shown color deviation in only one case. With dark-fruited *Euculis* it has consistently given the expected dark and light offspring.

These backcrosses to *V. rotundifolia* and others obtained by R. L. Farrar and B. O. Fry, as well as backcrosses to *Euculis* reported earlier (4), confirm the reality of an impressive degree of affinity between the species. Robust, resistant, fruitful, and showing broad segregation in a rich gene pool, these backcrosses lend further telling weight to the surmise that there is basically a higher degree of homology between the species than has hitherto been believed to exist.

**Summary**


The progeny, 3/4 muscadine, strongly resembles in vegetative characters the pollen parent, yet shows also abundant evidence of *Euculis* influence. All vines thus far fruiting deviate radically from the expected pattern of inheritance of color. Although these vines were predicted to be highly if not totally sterile, 40% of those blossoming to date have matured fruit, 3 vines approaching normal in fruit set. Several individuals have been further crossed with *vinifera* types. Seeds from all vines have proved normally viable.

These BC₂ to *V. rotundifolia*, complementing those to *Euculis* reported earlier (4), indicate a clear breach in the species barrier and thus establish the feasibility of combining at the diploid level these long-separated members of the *Viticaceae*.

**Literature Cited**


   
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