# Winter Injury to Grape Seedlings[1]

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THE winter of 1933–1934 was too severe to obtain fine distinctions between the hardiness of varieties and seedlings, and yet it differentiated the hardy from the unhardy and semihardy. On the night of December 29 the official temperature at the New York Agricultural Experiment Station was –21 degrees F, and on the night of February 9, –31 degrees F. February also experienced many other subzero nights, such as –11 degrees on the 6th, –16 on the 8th, and –18 on the 10th. These same temperatures probably did not occur in the Station vineyards, but nevertheless they indicate the approximate degree of cold. Abnormally sunshiny weather was also experienced during the month of February but this may not have been an important factor. Just when the injury occurred to the vines is not known, but a number of cuttings taken from semi-hardy seedlings between the two low points were winter-killed. The influence of previous yields, condition of the vines, and the exact number of buds killed are not considered.

In this report, 2748 seedlings of fruiting age are given consideration. One hundred and thirty-two crosses and 13 selfs are represented. Fifteen *Vitis vinifera*, 20 *V. labrusca-vinifera* varieties, and 35 seedlings of *V. labrusca-vinifera* derivation were used as parents. Some of the European varieties as Muscat Hamburg appeared nine times and others only once or a few times. In the *V. labrusca-vinifera* hybrids are included such varieties as Moore Early, Lucile, Fredonia, Portland, Ontario, Brighton, Iona, Brocton, Dutchess, Golden Muscat, Mills, and Keuka. Some of these hybrid varieties are largely *V. labrusca* in composition while others approach *V. vinifera* closely. Ontario, which has made an excellent parent, was used 35 times, Sheridan 15, Golden Muscat 12, Hubbard 11, Portland 9, Eclipse (Riehl's) 8, Moore Early 7, Keuka 7, Wayne 7, and the remainder from one to several times.

The 35 seedlings used as parents were derived from many varietal combinations. Some were first generation seedlings while others were second generation selections. In the table that is based solely upon species composition, the seedlings and the American varieties are considered as a unit. None of these seedlings may ever be named, but all of them possessed one or more noteworthy characters. Most of them were used comparatively few times. Beta and Clinton were the only *Vitis vulpina* representatives.

The vines that fruited in 1934 are recorded but in most cases the crop was light due to the loss of buds. Where fruit occurred, a portion of the top was alive except where a small cluster was produced by secondary flowers on a basal shoot.

A is used to denote no top injury; B, top alive but fruiting canes dead; C, killed to ground; D, dead; and W, weak. The intermediates between these classes are denoted by A– and B–. The weak were generally found in class C.

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TABLE 1—EFFECTS OF WINTER INJURY ON GRAPE SEEDLINGS

| | No. Crosses or Selfs | No. Vines | No. Fruited | Per cent Fruited | A | A— | B | B— | Per cent Not Killed to Ground | C | D | W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (*V. lab.* x *V. vin.*) x (*V. lab.* x *V. vin.*) | 82 | 1476 | 94 | 6+ | 22 | 32 | 124 | 25 | 14— | 1257 | 16 | 66 |
| (*V. lab.* x *V. vin.*) x *V. vul.* | 1 | 3 | — | – | 1 | — | 1 | — | — | 1 | — | — |
| (*V. lab.* x *V. vin.*) x *V. vin.* | 48 | 1038 | 1* | – | — | — | 6 | — | 1— | 1001 | 31 | 65 |
| *V. vul.* x *V. vin.* | 1 | 12 | 1* | – | — | — | — | — | — | 12 | — | — |
| (*V. lab.* x *V. vin.*) Selfed | 13 | 219 | 5 | 2+ | — | 1 | 3 | 4 | 3+ | 206 | 5 | 61 |
| Grand total | 145 | 2748 | 101 | | 23 | 33 | 134 | 29 | | 2477 | 52 | 192 |

*Secondary bloom.

The data presented simply substantiate well known facts. It is difficult if not impossible to say just what percentage of a certain species a certain variety or seedling may possess. If a supposedly pure labrusca is crossed with a pure vinifera as in the case of Roger's hybrids, one might assume that the resultant seedlings are 50 per cent *Vitis vinifera.* Using this standard of measurement, many seedlings that are nearly 85 per cent *V. vinifera* have been considered sufficiently hardy to produce fruit annually when grown at Geneva. This past year all of the Roger's seedlings growing on the Station grounds were killed to the ground. Brighton, Delaware, Niagara, Diamond, and many other well known kinds fared no better. Labrusca types, as Concord, Cottage, Colerain, and Moore Early came through with a fair crop and slight injury. Vulpina types, as Elvira, Noah, and Marion were particularly hardy. Time and space do not warrant a discussion of the performance of the 145 crosses and selfs covered in this report. As might be expected, certain varieties imparted a higher degree of hardiness to their progeny than others. Outstanding crosses that escaped winter injury in part are Fredonia by Worden (a cross made by F. E. Gladwin) Ontario x Moore Early, Ontario x Station 9976, and Ontario by 9978 (the last two being Concord Seedless types used by A. B. Stout), and 8187 by 9976 (Stout's cross). Selfs of 10903 and 10905 also produced hardy progeny. Sta. 8187 was obtained from a cross between Vergennes and Hubbard Seedless (a Concord Seedless type) and 10903 and 10905 from a cross between (Delaware x Goff) and Concord Seedless. Since Ontario did not transmit hardiness to most of its crosses and its selfs, Moore Early and Concord Seedless must be largely responsible for the hardy



seedlings in these crosses. The performance of other Concord Seedless crosses as also the selfs from 10903 and 10905 that contain Concord Seedless characters corroborates this statement.

According to Gladwin the Worden is hardier than the Concord and the Concord is slightly hardier than the Fredonia. Since Fredonia in three crosses did not transmit hardiness, Worden should probably be given the chief credit in transmitting hardiness in this cross. Seedlings derived from selfs are generally weak, and this fact is substantiated in this report, for the selfs gave proportionately 10 times as many weak plants as the hybrid crosses.

As already noted, many of the fine distinctions in winter hardiness of the grape were obliterated by the intense cold, but since winters like that of 1933 to 1934 are infrequent, it was thought that even the minor differences should be recorded. Not enough *Vitis vulpina* crosses were used to say anything about their hardiness, but judging from the cold resistance of many varieties that are largely *V. vulpina* in composition, it is obvious that this species should not be overlooked in breeding hardy grapes. *V. labrusca,* as is well known, is much hardier than *V. vinifera* and the performance of the seedlings noted emphasize this fact. For extreme hardiness a combination of the *V. vulpina* and *V. labrusca* types should prove excellent.