

The Effect of 2, 4-D on Well Established Grape Vines

C. L. PORTER, Purdue University

Three young grape plants of the Concord variety were planted in the Spring of 1930, on the property line between my own yard and that of the lot north of mine. Two of the plants were located in open space between the two properties. The third plant was in line with the other two but was south of a garage. All three plants bore fruit and leaves normal for the variety from the date of planting until the summer of 1949.

The three plants were pruned heavily in March, 1949. That same year at the time when the vines were in blossom, 2, 4-D was used as a weed spray in the lawn north of the vines. No spray was applied directly to the vines but a north wind carried a mist of spray across the exposed vines. Apparently the vine south of the garage was so well protected that little, if any, of the spray drift came in contact with it.

The fruit borne on the exposed vines in the autumn of 1949 were colored normally but the fruit bunches and the individual berries remained small. The leaves likewise were modified in appearance and size.

Fruit and leaves borne on the protected plant were normal in appearance and quality.

The vines were not pruned in the spring of 1950. Again, this year, the fruit and leaves of the exposed vines exhibited the same abnormal tendencies as were noted the previous year. Also, in 1950, the protected plant again produced normal and characteristic fruit and leaves.

The leaves of the plants that had suffered 2, 4-D injury differed from normal leaves in that the area had been reduced one half. The affected leaves were more uniformly and deeply serrate without the tendency to lobing characteristic of the leaves of the Concord variety. The affected leaves were a much darker green than were the leaves of the protected plant.

The fruit bunches from exposed plants had a ratio of length to normal leaves of 2 to 3. Bunches had a tendency to branch. The berries on each bunch were much smaller than normal and were more closely crowded. The berries had well formed seeds.

In 1840 boys who had gathered wild grapes along the river at Concord, Massachusetts, ate them in the yard of Ephriam W. Bull and threw the seeds away. The next year Bull noticed that some of these seeds had sprouted and he protected the little plants until the first bunch of grapes appeared in 1843. Seeds from this bunch were planted and fruited in 1849. The fruits were so excellent that Bull exhibited them at a meeting of the Massachusetts Horticultural Society in 1853. In this fashion the variety known as the Concord grape came into being.

Hedrick in his *Grapes of New York* thinks that this grape is a mutation of *Vitis labrusca*, the fox or skunk grape. Others believe because of stamen differences that it may be a cross between *V. labrusca* and some other species. Bull himself mentions that a Catawba grape was growing near by and his wild seedlings may have picked up some of this pollen. Today the Concord variety represents 75% of all the grapes grown in the Eastern United States. Furthermore, the Concord is the parent of many other of our domestic varieties.

Vitis labrusca is a species native to the Atlantic seaboard. It is described by Bailey as a strong vine climbing high on thickets and trees. Leaves, large and thick, strongly veined, broadly cordate-ovate, mostly obscurely three-lobed, or sometimes nearly continuous in outline deltoid-ovate, the margin shallowly scallop-toothed with blunt pointed teeth. The upper surface of the leaf is dull green becoming glabrous; but the lower surface densely covered with a tawny white, dun-colored, or red-brown tomentum.

Racemes short, berries usually less than twenty in the wild types, generally simple or very nearly so; berries large and nearly spherical ranging from purple-black to red-brown and amber-green.

I have presented here a series of observations. No claim is made that this record is one of exact experimentation. The amount and strength of the spray drift coming in contact with the plants are not known. It can not be asserted definitely that no spray came in contact with the plant protected by the garage, although it is obvious that it was physically impossible for this plant to receive the dosage to which the exposed plants were subjected.

In spite of these experimental uncertainties, it is evident that two plants exposed to 2, 4-D drift received a dosage that was beyond threshold strength, but less than lethal in amount. The affected plants were considerably modified as to the nature of subsequent fruit and leaf characters. This effect has been maintained for at least one year.

It is also clear that an adjacent plant which received a less amount of the 2, 4-D spray was not affected.

It is idle to speculate as what physiological effect this herbicide has had on the grape plant. It was surmised at first that the spray had caused a reversion to the wild type, but there is nothing in the description of *Vitis labrusca* that would substantiate such a hypothesis. The ease with which the Concord grape has been modified and caused to produce new varieties suggests that 2, 4-D may have been responsible for the creation of a mutation.