

AN EVALUATION OF BUD SPORTS IN THE APPLE

BY

M. J. DORSEY

University of Illinois, Urbana, Illinois

In vegetative propagation as encountered in horticulture, a biological process like cell division is put to a severe test. A clone—or variety—is usually defined as a group of individuals derived by asexual cell division from a single ancestral zygote. According to this definition, the cells which go to make up all of the plants of a variety are descended by somatic division from the original zygote from which came the seedling constituting the original plant of the variety. How many cells in a thousand acres of Concord grapes or Elberta peaches?

The outstanding feature of a variety planting is the great uniformity with which the process of cell division is carried forward, yet departures from the normal process do occur. Although they are relatively few, nevertheless more might be expected in view of the almost numberless times the chromosomes of the original zygote must be built up by growth processes and fractionated again in cell division. The constancy of this process so often repeated determines or underlies the uniformity of a variety.

It is those variations having a genetic basis in which we are particularly interested. In growth or cell descent as encountered in the fruit clones, at division each chromosome and each gene of the male and female complement must be equationally divided if the variety is to be held true to type. The different allelomorphs may be made up of two dominant or two recessive factors or a dominant and a recessive factor. A horticultural character such as color or size may be the expression of a large number of factors regardless of the number of chromosomes on which they may be carried. There is a background and a mechanism, then for adding to or subtracting from the original genetic combination of the parent zygote. It would seem that in somatic division whether the double, triple or any other chromosome multiple be present, a number of factor changes are possible. The mutation process in clones is probably similar to non-disjunction as in the heterotypic division in that it is possible for a single factor or more, or a single chromosome or more, to be affected.

As bud sports are so likely to be found by practical men, the more obvious types of departure from the normal would be expected to be observed most frequently. Characters such as deepened color, russetting, cut leaves, thornless branches, early or late ripening, quality changes, and giant fruit forms have been of fairly frequent mention. There is no reason why a large number of characters in addition to these should not be affected by somatic mutations. A more critical study of our fruit clones

will undoubtedly show this to be the case so that both the desirable and the undesirable bud sports of far-reaching consequence may be expected to occur.

Nor is this the end! If a bud sport possessing commercial value arises from a clone, why not in a bud sport which has, in turn, become the starting point or parent stock of a new clone? This has actually happened in some of the color sports and may be expected to occur in other characters as well.

Bud sports in the apple: In "The Apples of New York," Beach mentions Collamer as originating as a sport from Twenty Ounce. This variety was propagated as early as 1900. The Gano and Black Ben Davis are looked upon by some as bud sports of Ben Davis, but there is considerable doubt as to whether this is the case. While there was some activity in the twenty-year period or so following 1900 in selecting superior strains in the different fruits, one of the next dark-colored types reported as a bud sport from a known apple variety was the Red Duchess. The next "big sport" to occur was Starking from Delicious about 1920 or 1921. The following list, based in part upon a statement kindly furnished by Mr. J. T. Bregger, of the Washington Experiment Station¹ will illustrate the activity and interest in red color sports in the apple within the last decade or so.

The varieties are arranged in the order of the number of color sports so far reported and is admittedly incomplete.

Delicious	50	McIntosh	7	Ben Davis	2
Winesap	29	Spitzenberg	5	St. Lawrence	2
Rome	18	Baldwin	4	Chenango	2
Spy	11	Jonathan	4	Rambo	2
Stayman	9	Twenty Ounce	4	Winter Banana	1
Duchess	9	Willow	3	Westfield	1
Fameuse	8	Red Astrachan	3	Wealthy	1
Gravenstein	8	King	2	Summer Queen	1
Stark	7				

In addition to these, russet sports have been found in Golden Delicious and Grimes; giant sports in Jonathan and Rambo; and a "long hanging" or late maturing sport in Jonathan. The summary might be extended, but the data presented are sufficient to show the present trend in this direction.

Naturally, this movement brings up problems. The technique of testing bud sports needs study. The new types will have to be tested, compared, and the inferior ones eliminated. In some of these sports more has been accomplished to increase the level of color in the crop as a whole than can be brought about by the combined result of cultural practices. Care must be taken, however, not to expect too much in this direction. It should not be assumed, in selecting a bud sport on the basis of color, that other characteristics such as vigor or yield have not also been affected by mutation. On the whole, considering the immense background of inferior types from controlled crosses, bud sports of various types promise to be a fruitful method of improving clones. The grower—especially with tree fruits—is confronted with a practical problem in keeping the producing units up to date with thoroughly tested offerings from this direction. The whole should, therefore, be given careful genetic analysis, as well as an appraisal from the horticultural standpoint.

¹ Personal correspondence, February 6, 1932.