Bud Mutation in the Vinifera Grape. I. "Parthenocarpic" Sultanina

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THE Sultanina[1], or Thompson's Seedless, is one of the most extensively grown grape varieties in the world. In California alone, over 158,000 acres were devoted to its production in 1930 (3). The principal characteristic that places it in such high esteem for raisin and table use is the absence of bony seeds. Seed abortion in this variety is so constant when vines are grown under ordinary cultural conditions that we have yet to hear of anyone who has discovered even a single mature seed—this despite the fact that the variety has been in cultivation for many centuries, and a goodly number of berries have been consumed in the meantime. Consequently, in the absence of a means of sexual propagation, it is probable that heritable variant forms must owe their origin to somatic mutation.

In a block of 4-year-old Sultanina vines at the University Farm vineyard, one vine situated in a border row attracted attention by its more vigorous growth. When examined during the summer of 1933, most of the clusters were found to have comparatively few berries. More striking was the fact that the mature berries were much smaller than those of neighboring Sultanina vines. In addition, they were spherical, in contrast to the oval or cylindroidal berry typical of the variety, as shown in Fig. 1. The few clusters that were well filled had berries resembling in form those regularly produced by the Corinth or currant grape.

Careful scrutiny of this mutant vine failed to reveal any differences in foliage or cane characters. Since all the canes bore the same type of unusual fruit, obviously propagation had taken place from a preexistent vine or cane of the same type. A search in the same portion of the block revealed five more vines having the same characteristics.

The name "parthenocarpic" was chosen to designate the mutant, since the berries are apparently formed vegetatively. Abortive seeds are absent. Since there is no indication that seed development is even initiated, the type of defective ovule must correspond to that described by Pearson (2) for either the Black or the White Corinth. Preliminary examinations disclose that the pollen is quite normal in appearance, but, unlike the pollen of Sultanina, it shows a very low viability in 15 per cent cane sugar medium. Approximately three grains in a thousand emit pollen tubes.

The ovules are undoubtedly abnormal, since clusters dusted with pollen of the normal variety at the time of anthesis failed to set normal berries. Clusters intertwined at time of bloom with those on neighboring vines likewise set parthenocarpic berries. Occasionally a berry of the Sultanina type is formed among the numerous smaller berries (Fig. 1); and these, like the Sultanina berry, have abortive seeds. Of approximately 8,000 berries counted from the mutant vines, an average of 3 per cent were found to be "normal." Occasionally,

[1]The grape from which the Sultana raisins of world commerce are made.

therefore, ovules of the Sultanina type originate and reach the same stage of development as occurs habitually in the usual variety.

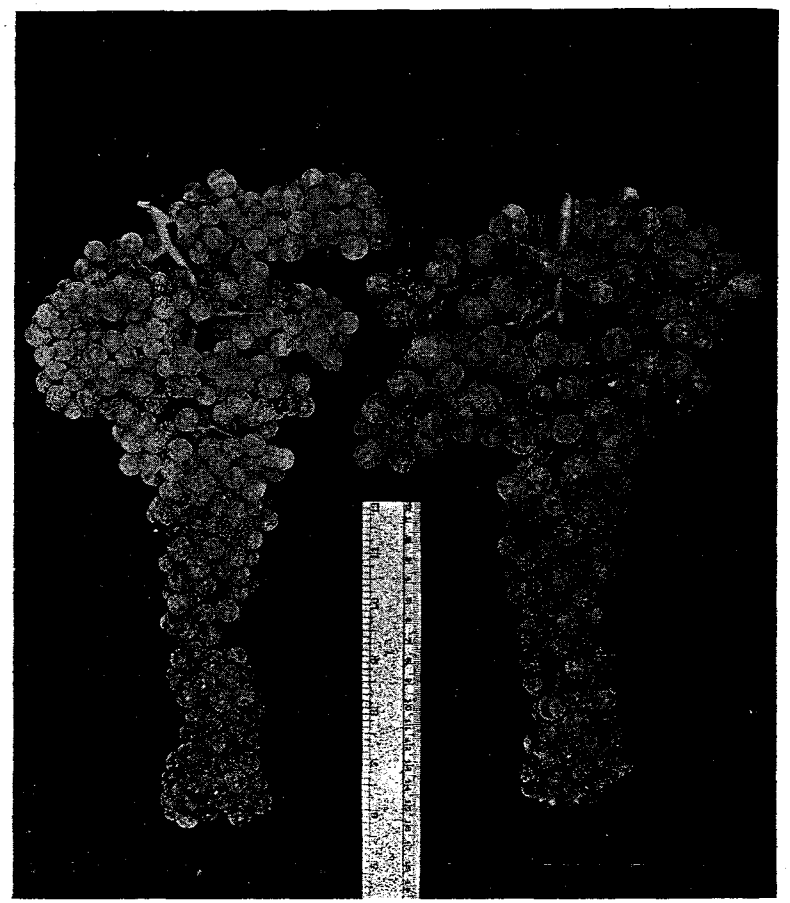

FIG. 1. (a) An unusually well-filled cluster of Sultanina "Parthenocarpic." It is lighter in color because it has been bagged since bloom. Notice the two normal berries toward the basal portion of the cluster. (b) Cluster of the normal Sultanina, or Thompson's Seedless.

As shown in Table I, the average yield of the mutant vines was less than one-fourth that of the normal strain in 1934. Straggly clusters probably explain the small crops produced by the "parthenocarpic" type. Possibly clusters having a good set may be obtained regularly by ringing the canes, a universal practice in the cultivation of the small, seedless-berried currant grapes. With ringing, however, the berries are likely to become so large as to be of no value in making currant raisins. "Parthenocarpic," therefore, is often of little or no commercial value. So far it can be considered only as an undesirable strain, inferior to Sultanina.

TABLE I--COMPARISON OF NORMAL SULTANINA AND THE MUTANT SULTANINA "PARTHENOCARPIC." SEASON OF 1934.[1]

	Weight of Crop		Av. Weight of Berry (Gms)	Shape of Berry	Seed Development	Pollen Germination, (Per cent)	Typical Cluster
	Vine	Yield (Pounds)					
Normal	S11–17	29.9	1.27	Oval to cylindroidal	Abortive seeds present	9.33	Well-filled
	S13–2	23.7					
	S13–4	22.0					
	S13–18	27.2					
	Av.	25.7					
"Parthenocarpic"	S11–18	3.6	0.53	Spherical to short oval	No seed development	0.37	Very straggly
	S13–3	4.5					
	S13–5	4.3					
	S13–19[2]	14.0					
	Av.	6.4					

[1]Data obtained from four mutant vines and four vines of the normal strain. Each of the latter was a vine adjoining a mutant. All vines were planted at the same time and received the same cultural treatment.
[2]Vine pruned very lightly in the fall of 1933.

The author has observed in Southern California a number of vines apparently identical with the type described herein. Possibly the mutation has arisen a number of times and is planted in more than one or two vineyards. Bioletti (1) has shown the futility of choosing cuttings from high-yielding vines in the selection of planting-stock for vineyards. He does not deny that bud mutations may arise; but their rarity is such that the chances of their being propagated are extremely small. The appearance of "parthenocarpic" Sultanina emphasizes the importance of selecting propagating material from vines that have been examined in fruit and are known to be true to type. The fact that this undesirable strain is usually much more vigorous than the normal and produces larger canes would favor its selection when cuttings are gathered from dormant vines. The danger to be avoided is the propagation of a mutation inferior to the normal strain.

LITERATURE CITED

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