

# Plant Chimeras—What They Are and How They May Arise

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In classical mythology a chimera is a fire-breathing monster, possessing the head and fore-parts of a lion, the middle part of a goat, and the hind parts of a dragon.

And while plant chimeras are not quite so frighteningly formidable as these animal monstrosities, they pos-

sess, nevertheless, a wierd composite of structure and parts which has baffled man for centuries. They are plants or plant parts in which more than one genetic tissue or structure live together as one. Thus, a grafted or budded plant is really a chimera, since a scion variety (as the Mont-

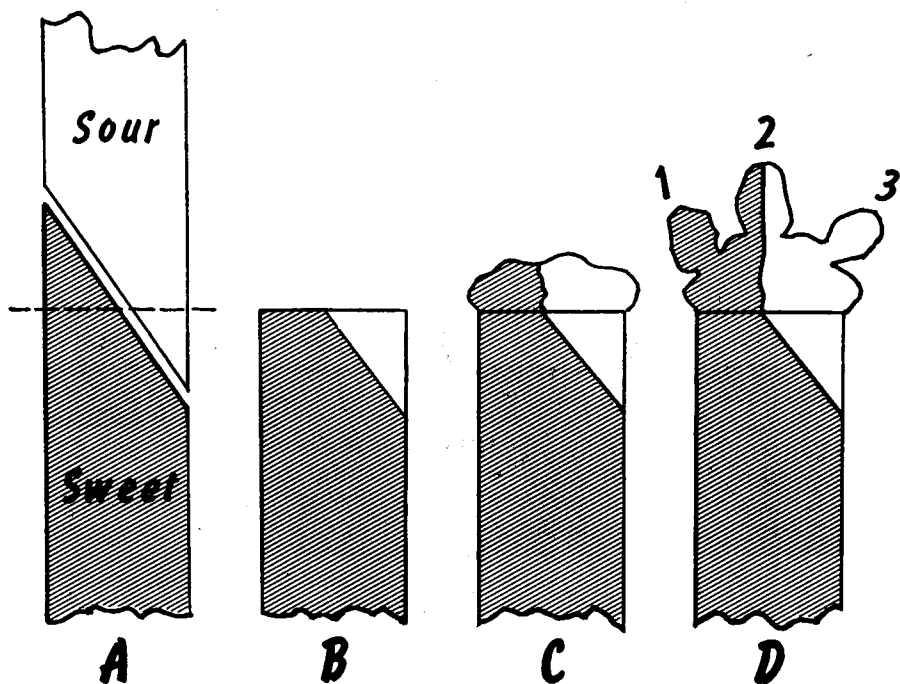


FIG. 1. How a sweet-and-sour apple chimera may be produced:

- A. Splice graft is made of sour variety on a sweet variety. Graft is cut as indicated in dotted line.
- B. Graft composed of portions of both sweet and sour varieties.
- C. Callus tissue arising from both sweet and sour sectors.
- D. Buds arising from callus tissue. No. 1 will be pure sweet; No. 2 will be a sectorial chimera of both sweet and sour; No. 3 will be pure sour.

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morency cherry) is caused to grow successfully on a rootstock of quite dissimilar nature (as the Mahaleb). Every fruit grower recognizes this situation, and knows that if a sucker arises from below the graft union, the resulting branch will bear fruit unlike the scion variety.

So much is easily understandable. But when unlike tissues grow, not one above the other, but side by side, as in the famous Sweet-and-Sour apple, or when they grow one within another, as in the Thornless blackberry, the phenomenon is less easy to comprehend. Yet, the principle is the same.

Perhaps the easiest way to explain

the situation is to look at Figure 1, which attempts to show how certain types of chimeras may be produced. Thus, suppose a sweet apple is grafted onto a sour apple, using the splice graft shown in Figure 1. Obviously, a shoot which arises from the sweet variety scion will bear sweet apples, whereas a shoot which arises from the sour variety stock will bear sour apples.

But now let us cut through the graft in such a way that part of the sour variety stock is growing side by side with the sweet variety scion. As any plantsman knows, callus tissue will form over the cut surface of the graft,

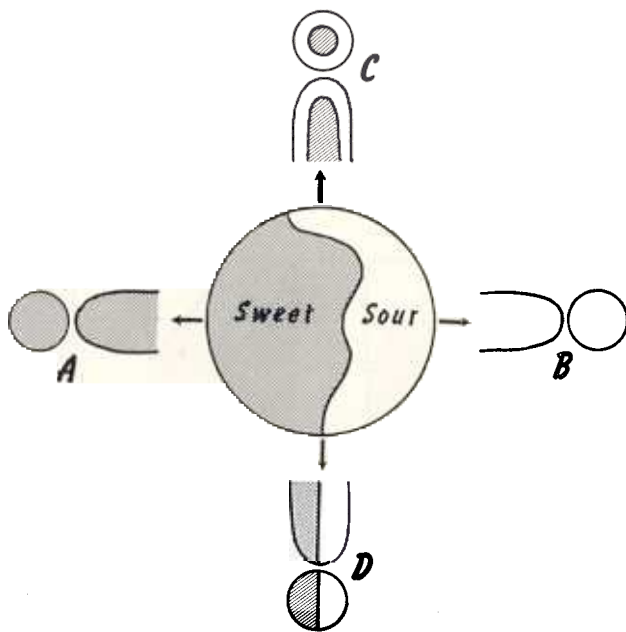


FIG. 2. Diagram of sectorial chimera of sweet-and-sour apple showing four types of branches and fruit which may arise from such a situation.

- A. Pure sweet branch and fruit.
- B. Pure sour branch and fruit.
- C. Sweet-and-sour periclinal chimera with branch and fruit with sour exterior and sweet interior.
- D. Sweet-and-sour sectorial chimera with one sector of branch and fruit sweet and another sour.

and part of this callus tissue will be from the sweet variety scion and part from the sour variety stock.

Next, if a bud forms in the sweet variety callus tissue and develops into a shoot, it will bear sweet apples. Likewise, if a bud forms in the sour variety callus tissue and develops into a shoot, that shoot will bear sour apples.

A third possibility is for a bud to arise from callus tissue which is part sweet variety and part sour variety. When such a bud develops into a shoot, one side may bear sweet apples and the other may bear sour apples. Or, better yet, part of a single apple may be sour and part may be sweet which is exactly the situation with this surprising variety.

When the chimera is composed of unlike tissues lying side by side, as indicated above in the case of the Sweet-and-Sour apple, it is called a sectorial chimera—that is, in sections. Apple fruits with strikingly colored segments or stripes are usually bud mutations which are also sectorial chimeras, as are oranges with similar color segments.

But sometimes the chimeral tissues are not side by side in sectors, but one within the other, like a hand within a glove, in which the hand is one tissue and the glove the other. This is called a periclinal chimera, and originates as shown in Figure 2. Thus, a bud pushes out from a section of the chimera so that, in the case of the Sweet-and-Sour apple, the inside of the apple might be sour and the outside might be sweet—or the reverse might be the case.

As a matter of fact, chimeras which occur due to natural mutation, are far more common than is frequently realized. Most variegated plants (mottled green and white, red and green, and so on) are chimeras. Many giant forms of fruits are chimeras. Many

thornless plants are chimeras. Many color sports are chimeras. No wonder that plantsmen have been confused by some of the strange forms which they have observed—red roses that seemingly revert to white, sour apples that revert to sweet, thornless blackberries that revert to thorny, or nectarines that revert to peaches.



### Some April Reports on Frost Damage

*From Indianapolis, Indiana area*—Early blooming varieties such as Red-skin have been practically wiped out by the April 8 freeze. Colara and Belle of Georgia look the best, followed by Halehaven, Red Haven and Jubilee.

*From Bedford, Kentucky*—A grower reports a full crop of Mikado, Haleberta, Juneberta peaches, and half a crop of Halehaven, Fairhaven, Stoner, and Vedette. Hurt the worst were Brayberta, Elberta and Golden Gem. Apples were hurt, especially Red Delicious.

*From Laporte, Indiana*—Jonathan apple buds are badly hurt on all low spots. Of the peaches, the Haven varieties were hurt the worst, and Elberta the least by  $-10^{\circ}\text{F}$  this winter followed by  $13^{\circ}\text{F}$  on March 13.—C. L. Burkholder, Purdue Univ., Lafayette, Indiana.



A new series of apple rootstocks known as **Malling-Merton** is being developed in England, with the purpose of eliminating the imperfections of the Malling rootstocks. Four from this series will soon be released in England. They are also now under test in this country.