

Alternate Bearing of Avocado

May be corrected eventually by one of two possible solutions to problem

Robert W. Hodgson

The first good fruit-set of most varieties of avocado that is carried forward toward maturity—actual maturity of the crop is not necessary—starts the tree in its alternate bearing habit.

Thereafter the trees are either in the *on-crop* phase or the *off-crop* phase.

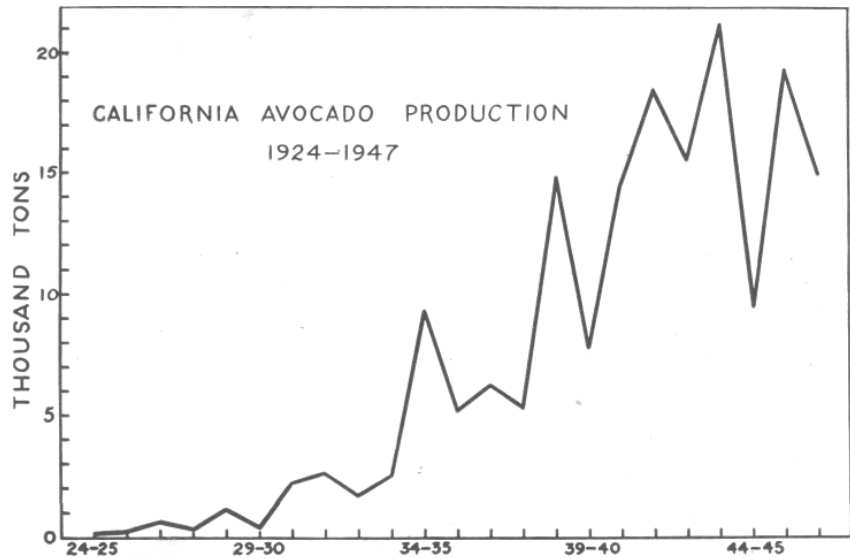
Two really good crops never occur in succession on trees—such as the Fuerte—that are characterized by the alternate bearing behavior while the trees remain in good health.

Efforts to find the causes of alternation in bearing have produced evidence that reserve materials in the tree are depleted so much that the tree requires a full season, at the minimum, to recover from the effects of the depletion.

Alternation now is thought to be associated with the carbohydrate supply.

The Fuerte

It doesn't take a very large crop to put Fuerte trees into the alternate bearing condition. A good crop followed by a fair crop—which can and does occur—can result in a change in stride of alternation. The tree is thrown out of the regular alternating cycle and changes stride where it remains until it is changed again for one reason or another.



In the past 22 years four changes in stride have occurred throughout the avocado districts in California.

From considerable study it is concluded that mean temperature during the flowering and fruit-setting period causes these sequences of crops which result in changes in stride.

Warm weather appears definitely favorable to the fruit-setting process in the

avocado and the opposite is likewise true —cool weather is not favorable for the setting process.

The dividing point for the Fuerte avocado is approximately the mean temperature of 56° F.

Influencing Factors

Four combinations of factors apparently determine and explain the bearing behavior of the avocado, notably the Fuerte variety. These are the two phases of alternating crops, and favorable temperatures during the blossoming and fruit-setting period, or unfavorable temperatures occurring in that same period. The four possible combinations therefore are the following:

1. The on-crop phase and favorable temperatures. The result is an avocado crop ranging from large to very large.
2. The on-crop phase and unfavorable temperatures. Under these conditions the crop is never larger than medium and it may be light, depending upon how unfavorable the temperature conditions are.
3. The off-crop phase and favorable temperatures. This results in a light to medium crop, the amount of crop being dependent upon the size of the crop that preceded it.
4. Finally, there is the worst combination of all—the off-crop phase and unfavorable temperatures.

This last combination always results in light crop or crop failure. The last time it happened was in 1944-45. Eighty per cent or more of the trees were in the off-crop phase when nothing short of the most favorable temperatures could possibly induce them to produce anything other than a light crop. Instead of favorable temperatures that spring was the coolest on record for many years. The result was the smallest crop in years.

Study of the temperature records reveals the reasons why four changes in stride have occurred during the past 22 years. For example, three of these changes in stride arose from the same combination of conditions—two mild winters and warm springs in succession. The usual situation was that the first of these was mild and the next even milder, sufficiently so to change the stride from the off-crop phase to the on-crop phase because the crop that had preceded the change was a medium or light crop.

Mild Temperatures

The combination of two unusually mild fruit-setting periods in succession brought about the changes of stride in 1931 and again in 1941, and probably also in 1926 although there is inadequate data to justify a definite conclusion.

In 1931 the change in stride followed the exceptionally mild winter and spring of 1930-31, which in turn followed the mild winter and spring of 1929-30.

Cool Temperatures

The cause of the change in stride that occurred in 1934 was just the opposite. In this case there were two unusually cool winters and springs in succession. That

change goes back to the unusually cool winter and spring of 1932-33, which in turn followed the cool winter of 1931-32.

Virtually every horticultural practice has been tried to correct the alternate bearing behavior of the Fuerte avocado variety. Among these are orchard fertilization, fruit-thinning and pruning.

Of all the practices tried, only one worked, but unfortunately it is not applicable to commercial practices.

That was very early harvesting—as soon as the fruit attains horticultural maturity—coupled with girdling. When these were done it was possible on individual limbs to produce two good crops in succession and to change the stride of alternation so that limbs on the same tree were in opposite stride.

Early harvesting without girdling did not accomplish the desired result.

The conclusion has been reached that there are really only two solutions to the problem of alternate bearing in the avocado.

One of them is finding strains or seedlings of Fuerte that are less subject to the factors that cause alternate bearing. Evidence exists that there are at least two strains and one that is somewhat better than the other has been isolated. The better strain seems to be less sensitive to unfavorable temperatures during the fruit-setting period, and its alternation is more regular and perhaps not quite so wide in amplitude as that of the other strain.

The other solution—upon which work was started several years ago—is the breeding of varieties that have the desirable market and other qualities of Fuerte but are less subject to the alternate bearing habit.

There is some hope in the picture because there are some varieties that don't alternate much. Perhaps by using them as parents in a breeding program their desirable characters in this respect can be converted to their progeny, and at the same time the desirable characters of Fuerte can be brought into the progeny. If so, the resulting product will be better than anything produced now.

Robert W. Hodgson is Assistant Dean of the College of Agriculture at Los Angeles, Professor of Subtropical Horticulture and Subtropical Horticulturist in the Experiment Station, Los Angeles.