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Our Research Program on the Minor Subtropical Fruits

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The Division of Horticulture welcomes the official announcement by the California Avocado Society of its interest in the culture of other subtropical fruits of minor importance in southern California, as evidenced by the appointment of a standing committee to describe varieties and register promising seedlings and the opening of the Yearbook to articles dealing with these fruits. It is the purpose of this brief report to acquaint the members of the Society with the current status of the research program of the Division of Horticulture on some of these fruits.

THE ORIENTAL OR KAKI PERSIMMON

Our research program on this fruit had its beginning in 1928 with the establishment of plantings at the Citrus Experiment Station, Riverside, which ultimately provided the materials for varietal studies and training and pruning trials. Plantings were first made on the Los Angeles campus of the University in 1930, and in 1940 and 1942 additional plantings were made which provided for the removal of the project from Riverside, where climatic conditions had been demonstrated to be unfavorable.

With a few relatively unimportant exceptions, all the varieties introduced into the United States prior to 1928 have now been described and their horticultural characteristics inventoried. Most of the more recent introductions are included in or provided for in the 1940 and 1942 plantings, among which are a number of non-astringent varieties reported to be equal or superior to Fuyu, the best known variety of this type previously established in this country. Some of these are fruiting this season for the first time. In the variety studies thus far, a few comparatively good new varieties have come to light but none which seems likely to replace Hachiya, much the most important variety now grown in California.

These studies have contributed materially, however, to the knowledge concerning the floral situation in this fruit, its ability to set and mature fruit without pollination, and its bearing behavior. With reference to the floral situation, five groups have been determined, two of which seem not to have been previously recorded. Most of the varieties regularly produce only female flowers and hence the fruits are seedless from isolated trees or solid block. A few regularly produce both female and male flowers, hence the crops usually consist of a mixture of seedy and seedless fruits. Another group usually has only female flowers and seedless fruits but occasionally also has male flowers and both seedy and seedless fruits. Still another group usually has both kinds of flowers and both seedy and seedless fruits but occasionally has only female flowers and seedless fruits or male flowers and no crop. And finally, there are a few varieties which produce only male flowers and therefore never any crops, hence may be useful only

where pollination and seediness are desired. For nurserymen with pistillate varieties who desire a seed supply for rootstock purposes, these varieties may be useful, and also for young plantings of vigorous trees of pistillate varieties where excessive shedding of the fruit results in poor bearing. These studies have also indicated that most, perhaps all, Oriental persimmon varieties have the ability to set and mature fruit, which is seedless, without pollination. *They have also shown that most varieties, when the crops are seedy, have a marked tendency to overbear which results in alternate bearing, heavy crops being followed by light crops and vice versa.

*Hodgson, R. W.—Floral situation, sex condition and parthenocarpy in the Oriental persimmon. *Amer. Soc. Hort. Sci.* 37: 250-252, 1939.

On the other hand, vigorous-growing trees of some pistillate varieties, where the fruit is seedless, often fail to mature satisfactory crops because of excessive shedding of the fruits. Hachiya variety is notably subject to this fault. A study of this phenomenon has shown that if the vigor of growth is checked by girdling during the spring months the fruit-drop is usually much reduced. * Observational evidence indicates that the shedding is materially less where pollination occurs and the fruit is seedy.

Rootstock trials have also contributed to our understanding of this problem. Thus with Hachiya the lotus rootstock appears to invigorate the trees and accentuate the shedding of the fruits. Certain it is that on the kaki rootstock this variety bears much better, at least during early life. These trials have also demonstrated the marked inferiority of the lotus rootstock for the Fuyu variety. In this case the tree is productive but dwarfed and short-lived. At present the kaki rootstock appears to be the safest to use, though Fuyu has done exceptionally well on the virginiana root-stock. *Kaki varieties suitable as sources of seed supply without resorting to the use of pollinators include Maru (as known in Placer County), Siang and Kishimoto (these seem to be identical), and P I 58971 (the last three are introductions of the U. S. Department of Agriculture). A new and larger rootstock trial was planted this spring.

Limited training and pruning trials with the Hachiya variety, conducted under rather unfavorable conditions, suggest that the modified open head or delayed leader form is best for this variety, and clearly show that with young trees pruning is markedly repressive to both growth and early bearing.

THE LOQUAT OR JAPANESE MEDLAR

A variety collection was started in 1930 and now contains nine varieties, including the three principal kinds grown in Japan—Tanaka, Mogi and Kanro—and a number of promising seedlings. Thus far the Japanese varieties all seem to resemble Thales, our principal commercial variety.

Yield records for the past five years support the conclusion that once a loquat tree bears a heavy crop it tends thereafter to alternate in bearing, with small fruit in the heavy-crop years and somewhat larger fruit in the light-crop years. Four years of experiments on

fruit thinning, fruit-cluster thinning, and flower-cluster thinning strongly suggest that these practices provide effective means for controlling this alternate bearing behavior and increasing the size of the fruits. The latter seem to be approximately proportional to the per cent of fruits or clusters removed. Moreover, if the thinning consists of the removal of the late clusters the per cent of early ripening fruit is materially increased. *The easiest and most effective method of thinning appears to consist in the removal in late summer or early fall of about three-fourths of the young flower-clusters, at the stage of development when they do not exceed three inches in length.

Plans are now underway for a trial of dwarfing rootstocks, including the Angers quince, to determine the practicability of maintaining small but healthy and good-bearing orchard trees and thus reduce the cost of hand operations, such as thinning and harvesting.

*Hodgson, B. W.—Girdling to reduce fruit-drop in the Hachiya persimmon. *Amer. Soc Hort Sci.* 36: 405-409. 1938.

*Hodgson, R. W.—Rootstocks for the Oriental persimmon. *Amer. Soc. Hort. Sci.* 37: 338-339 1939.

*Hodgson, E. W. and E. R. Eggers—Experiments on fruit-cluster thinning in the loquat *Yearbook Calif. Avocado Assn.* 1940: 71-75. 1940.

THE CHERIMOYA

A variety collection was started in 1934 but the freeze of January, 1937, reduced it to three trees—2 of *Deliciosa* and one of *Booth*. The behavior of these trees, and of others in commercial plantings, supports the conclusion that *Deliciosa* is definitely hardier than most other varieties and *Booth* intermediate. A new collection was planted in 1939 and now consists of eleven varieties and several promising seedlings, most of which are fruiting this season for the first time.

Much the most important contribution thus far has been the work of Mr. C. A. Schroeder, graduate research assistant, who has demonstrated that hand pollination is both practicable and highly effective. *Very large increases in yield and much higher percentages of well-developed fruit result from this practice, properly employed.

Last year Professor W. E. Lammerts began a breeding program on this fruit with the objective of developing high quality, good-bearing varieties of maximum cold resistance and minimum seed content. Several hundred seedlings of known parentage are now growing in trial grounds.

THE WHITE SAPOTE AND MATASANO

A collection of varieties and promising seedlings of these two very closely related fruits was established in 1939 and now contains ten named varieties and four promising unnamed seedling fruits. A large number of young seedlings of both fruits, some of known parentage, is growing in the trial grounds. It is believed that some of these may prove to be as good or better than any of the present named varieties.

THE FEIJOA

The variety collection started in 1930 now contains all the named varieties currently propagated, several promising varieties found in other plantings, and a number of seedlings of known parentage. In addition there is a collection of 235 young seedlings of known parentage, a considerable number of which fruited this season for the first time. A recent survey of these seedlings suggest that some of them may be equal or superior to any of the present named varieties.

THE CARISSA OR NATAL PLUM

The variety collection now contains four named varieties all of which appear to be superior to the average seedling fruit. It is hoped that a hedge planting of several hundred seedlings, most of which are now in bearing, will disclose even better varieties of this fruit.

GROWER COOPERATION SOLICITED

We shall be grateful indeed for the cooperation of growers and nurserymen in calling to our attention trees of rare and little-known varieties of these and other minor subtropical fruits, and to seedlings of unusual merit or promise, so they may be added to our collection and included in our studies.

* Schroeder, C. A.—Hand pollination effects in the cherimoya. Yearbook Calif. Avocado Soc. 1941: 94-98. 1941.