Clonal Selection in Relation to Disease of Lemon Trees

by

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In the literature on lemon culture in California there are frequent references to tree deterioration commonly called "lemon decline," or other names which emphasize the relatively short period of usefulness of some lemon trees in this state. Decline has often been transitory but recurrent. Some trees that have been severely affected appeared normal two or three years later. This characteristic of many lemon orchards is in great contrast to many of the old and useful orange and grapefruit orchards.

The importance of selection among the various strains of lemon varieties as a means of producing more vigorous, long-lived and productive orchards has been recognized for many years. The Citrus Experiment Station started a study of certain selections in 1936. Selections were mainly within the three principal varieties of lemons grown in California, Eureka, Lisbon, and Villafranca.

The longevity of the trees is ultimately more important than their relative production during the first ten years. The probable useful length of life of the trees was therefore given careful consideration when the selections were made. Parent trees were selected for one or more of the following reasons: (1) widely used trees with good production and good fruit quality; (2) especially old and healthy trees; (3) representative trees from especially successful orchards; and (4) trees the progeny orchards from which seemed very vigorous, productive, and long-lived. Forty-five trees were used for each selection in this study, except that 50 trees of the U.S.D.A. selection were utilized. The strains were scored for degree of general decline from 0, which was normal, to 3, which was extremely badly declined.

All selected strains were medium to good producers for their respective varieties during the first eight or nine years. By the time the trees in the 1936 planting were eight years old the average production of seven strains of Lisbon amounted to 12 percent more total fruit during five seasons than the average of five selections of Eureka. When the trees were in their thirteenth year, the Lisbon strains for that year averaged 39 per cent more fruit than the Eureka. Since that date, when some of the weaker Eureka strains began to decline, actual yields have not been recorded. It has been clear from inspection, however, that during the last few years some of the best strains of Lisbon have produced two- or three-fold as much fruit as the best of the Eureka selections or several of the inferior strains of Lisbon.

The value of these studies is clearly apparent at the present time, since it is now possible to determine the strains which are most prone to decline, and also the earliest to develop shell bark. Shell bark is a disease affecting the trunks and main limbs of lemon trees. It is frequently associated with general deterioration of the trees. This disease is illustrated by Figure 1.

Those selections which are so far free from decline stand out in bold relief in the orchards. Most of the Eureka strains began to show some decline by the time

Fig. 1. A lemon tree affected with shell bark, on the lemon trunk. Note that it stops at the line of the orange rootstock.

they were 10 years old. Some of the weakest Lisbon strains were also subnormal in their appearance by that time.

In Table 1 are listed the strains in the orchard planted in 1936. Both the degree of decline prevalent in 1951 and the percentage of the trees showing some degree of shell bark are shown. A review of this table shows that all the Eureka strains average from badly to extremely declined and most all Lisbons are relatively free from decline. All the Eureka selections but one are quite badly affected by shell bark; the Lisbons are relatively free from it. It is apparent that most of the strains of Eureka in this orchard are very nearly, if not quite, worthless. One of the Lisbon selections also has proved to be worthless.

At present some of the greatest contrasts are between the normal, vigorous Lisbon selections such as the Rosenberger, on one hand, compared with the subnormal ones, on the other hand. This is illustrated by Figure 2, showing a normal, vigorous strain compared with one badly devitalized, in an orchard planted in 1940.

In addition to studies in these experimental orchards, many observations have been made of commercial orchards. As a result of these observations it is concluded that most, if not all, of the older strains of Eureka are relatively short-lived. Some Lisbon strains, especially the "open type," are about equally as short-lived under most conditions. However, some of the so-called "short-thorned Lisbon" strains such as the Rosenberger, Prior, and others give promise of producing long-lived orchards. Some of the parent trees of other Lisbons, such as the Keen, Prior, Price, and Monroe, are from 40 to over 60 years old and are in good condition. Furthermore, progeny orchards from some of these old parent trees are more than 25 years old and in excellent condition. In addition to this consideration is the fact that the Monroe and Rosenberger Lisbons have proved to

Table 1. The average degree of lemon tree decline and percentage of trees showing shell bark. (Orchard planted 1936 in Fillmore, using sweet orange rootstock.)

Selection	Average degree of decline	Per cent of trees showing shell bark
EUREKA		
Ross (10-1)	1.8	0
Sespe (3-42-15)	2.5	63
Sespe (17-13-19)	2.2	37
Thornton (12-4)	2.6	22
U.S.D.A.	2.5	53
LISBON		
Cavers (7-21)	0	2
Ledig	0.2	0
Matzen	0.1	9
Rosenberger (2-2)	0	4
Ross	0.3	7
Thille	0	15
U.S.D.A.	2.2	23

Fig. 2. Shows selection of vigorous Lisbon lemon strain on the reader's left and a particularly poor strain of Lisbon on the right. Trees 12 years old; measuring rod is 12 feet tall.

be heavy producers in the extreme coastal area, while the Prior Lisbon has produced especially well in the intermediate areas. There is much to be said in favor of some of these best selections of the Lisbon lemon, based on their tendencies to be long-lived, very productive, and to produce fruit which has made a good record in packing-house and storage trials.

Under the present marketing conditions, a relatively high percentage of all lemons must be sent to the processing plants. In the case of the higher-producing Lisbon varieties, the obligation to send a certain percentage of the crop to the processing plants can be fulfilled, leaving a still greater tonnage of fruit to go to the fresh fruit market than in the case of the Eureka variety. Under these conditions, whether these comparisons are made on a tree basis or an acre basis, the best of the Lisbons produce a larger tonnage of fruit for both the fresh fruit market and the processing plant than the Eurekas.

Meteor Cherry—A Correction

In the second paragraph of the Meteor Cherry article, page 11 in the Spring, 1953 issue of the DIGEST, the editor stated that the Meteor was selected by W. R. Leslie, of the Canada Agricultural Experiment Station, Morden, Manitoba. Mr. W. S. Weir, of the Fruit Breeding Farm, Excelsior, Minnesota, was kind enough to call our attention to the error of this statement. Mr. Leslie selected the male parent of Meteor, but the Meteor cherry itself was selected by Prof. W. H. Alderman of the University of Minnesota.

—G. M. K.

Ranger Peach

A number of letters have been received by the editor requesting the names of nurseries handling the Ranger peach. In response to these requests, the following nurseries are suggested:

Shahan's Nursery, Tullahoma, Tenn.
Harrison Nurseries, Berlin, Md.
Bountiful Ridge Nurseries, Princess Anne, Md.