

INVESTIGATIONS AT THE CITRUS EXPERIMENT STATION IN RELATION TO THE AVOCADO INDUSTRY

Dr. E. R. Parker

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The establishment of a new horticultural industry brings with it a great number of important problems. In the earliest years these problems are ordinarily indefinite in character, and their scope and relative importance cannot be easily established. They can only be outlined by comparison of the crop in question with other well established crops, and as a result of the experience of the pioneers of the industry.

The avocado industry in California has been exceedingly fortunate in attracting the membership and leadership of men who were either trained in horticulture, or who possessed sufficient vision to foresee some of the general problems of the new industry. The patient efforts and sacrifices of these enthusiastic growers and investigators, who are willing to pool their knowledge and experience for the common good, have been of inestimable value. They merit our greatest respect.

The avocado industry is also fortunate in that it shares many of the problems of the Citrus industry, and has been able to profit by its experiences. The "big brother" of all the sub-tropical crops has pointed the way for the solution of many problems which are shared mutually. Among them are the problems of marketing, including those of standardization. Precedents have been set which will be of great value.

The earlier establishment of the Citrus industry has also simplified the problems of avocado production. It has made it possible to determine, at least to some extent, the areas which are relatively frost free and may be adapted to the growing of avocados. It has also outlined some of the more important problems of production.

It is in this respect, perhaps, that the Citrus Experiment Station has been of most service to the avocado industry. The increasing fund of knowledge of certain phases of Citriculture can, fortunately, be carried over outright, or with some modification, to the production of avocados. Most of the few insect pests and diseases which are found on avocados in California also attack Citrus trees or fruits, and have been studied intensively. Their control by artificial means and natural enemies is a subject of constant study. Soil problems, such as alkali reclamation, irrigation, and fertilization, are being constantly investigated. Some fundamental physiological responses which have been studied with Citrus material may logically be assumed to apply to avocados.

In spite of the fact, however, that there are many problems connected with the production of avocados and of Citrus fruits which are identical in character, there are many which are only parallel, and for which the reaction of each crop should be determined independently.

There are also some problems which are peculiar to avocado production. The Citrus Experiment Station, under the directorship of Doctor H. J. Webber, who served as an officer of your organization during a period of its early history, is interested in these problems. As the fund of knowledge dealing with avocados has increased an attempt has been made to determine the relationships and importance of the general problems, so that they may be reduced to a specific question or group of questions which can be studied effectively. As a result some research has been carried out and more is in progress at the present time solely with avocado material. It may be interesting to you to know of some of the work that is in progress.

In plant Physiology, Dr. Haas is studying the responses of young trees to varying nutrient conditions in artificial culture media. His studies on factors accompanying "tip burn" and chlorosis are already known to you. He is extending them by attempting to cause the diseases artificially and in this way verify his former work. He is also obtaining some very interesting data as to the requirements of the trees for various chemical elements, and as to symptoms of deficiencies.

In plant Pathology, Professor Home has brought a wealth of experience in subtropical Pathology to the study of avocado diseases, both of the tree and of the fruit. Professor Home and the speaker have recently started cooperative experimental work to determine the cause and reactions of the disease which Doctor Coit has designated by the name "*sun Blotch*". We feel that almost anything may happen in this experiment, for the cause may be pathological, physiological, or genetic in nature. It is especially important to know whether the disease may be transmitted in any way, and how it may be prevented. There are other disorders, some of which appear to be physiological, which interest us. We are throwing out feelers in order to find some method of analyzing them.

The avocado planting at the Citrus Experiment Station at Riverside was started in 1919 by Dr. Webber. About 85 seedlings were planted in that year. Since that time a number of budded trees have been planted by the Division of Orchard Management, until there are representatives of about 40 named varieties on the property. Many of these are small trees. It is planned that the planting will be extended, in the expectation that it will furnish information concerning varietal response in the interior regions and also experimental material for the study of problems of flower bud formation and fruit setting as these problems become more definite.

In the Division of Orchard Management, we are interested partly in testing the results of laboratory studies in the orchard. On the other hand, it is sometimes possible also to obtain a suggestion as to the nature of a problem in the field, which can be given to an investigator in one of the more fundamental sciences for study in the laboratory under controlled conditions. We are also interested in learning the answers to cultural problems from the reactions of the trees in the field. For this season we are anxious to determine where the problems of production, such as fertilization, fruit setting, rootstocks and soil management lie in order that they may be studied intelligently, and with greatest benefit to the grower. We hope that we will have the opportunity and facilities to work on these problems as they become apparent to you and to us.