

AVOCADO FRACTIONAL EMBRYO GRAFTAGE

Hamilton P. Traub and E. C. Auchter

Bureau of Plant Industry, U. S. Department of Agriculture, Orlando

The subject assigned to us, "Avocado Fractional Embryo Graftage," covers a part of the work on the propagation of subtropical fruit plants which has been carried on for about two years at the Orlando Station. The experiments with the sprouting and grafting of fractional avocado embryos have been previously reported on in a preliminary way (1, 2). In these earlier reports the general physiology was considered. In the present and future work the purpose is to apply the principle to the practical problem of nursery avocado propagation. The speed with which such experiments, covering necessarily a period of several years, may be completed is dependent on the availability of a generous monthly supply of good seed and graftwood. Through the generous and wholehearted co-operation of Mrs. I. B. Krome, of Homestead, Florida, and the Calavo Growers of California, these details are being taken care of.

In the consideration of a propagation method, the grower wants to know how and when to perform the operation, the kind and condition of seed and graftwood to select, the kind of sprouting medium to use; how to control diseases during the sprouting period, and the percentage of unions he can reasonably expect under a particular set of conditions. These questions cannot be answered in this progress report. We can go only as far as the experimental results warrant to date. After giving a brief summary, the information now at hand will be shown; by means of a series of lantern slides.

In general the method of fractional embryo graftage consists of wedge grafting a scion, two to five inches in length, into the meristematic tissue of the fractional embryo either vertically from the top or at an angle of about 45 degrees, into the center of the embryo where it unites with the cotyledon. The fractional embryo may be used

In at least three developmental stages, (a) dormant, (b) just sprouting, and (c) sprouted still farther. In a variation of (a) and (b) above, the whole embryo may first be sprouted and then split lengthwise into approximately equal parts including the root or roots. (Plates 16 and 17.)

Avocado seeds are of various shapes, from long narrow, pointed to approximately spherical and flattened. It will facilitate matters to describe the insertion of the graft in case of the last named where a cotyledon represents an approximate sphere. First a section shaped like an acute pyramid with its point in the center of the fractional part of meristematic tissue is removed. In performing the operation two cuts, from one-fourth to one-third inch apart, are started at the edge of the cotyledon at the plumule end, or 45 degrees in either direction on the edge. The cuts are slanted inward at an angle of approximately 25 degrees on the flat side of the cotyledon toward the center of the embryo, and also toward each other, at an angle of approximately 45 degrees, on the curved side of the cotyledon. When these cuts are carried to their intersection the

desired section may be removed. The scion is prepared to fit into the opening. Beginning at the base of the lower bud with even strokes of the knife, a three-sided, pointed wedge is formed. The uncut curved surface is placed on the outside and the pointed edge toward the center of the opening in the fractional embryo. The pointed wedge is then inserted firmly but not too tightly with the point in the center of the fractional embryo, for care must be exercised not to crush the cells by the use of too much force. No tying is needed. Any exposed cut surfaces should then be covered with 45 to 49 degree C. melting point paraffin (1). Care must be exercised not to force the paraffin between graft and meristematic tissue of the fractional embryo. The opening on the curved side of the cotyledon is filled with paraffin, the graft being held at a slight angle with the scion uppermost.

The grafts are planted either sideways or flat side up at an angle of 45 degrees in cypress flats five inches high. The types of propagation media of most value for this purpose have not been determined experimentally. In the earlier work cypress sawdust was utilized and in the present experiments a mixture of one-half sand and one-half granulated sphagnum peat is being used. Additional experiments on sprouting media must be conducted before final recommendations can be made. When sprouts appear the grafts are transplanted to 6x6x12 inch cypress plant boxes or in the nursery row.

Since November, 1933, the work has been carried out on the basis of 250 to 350 grafts per month, including the varieties, Lula, Taylor, McDonald, Winslowson and Waldin. Later Trapp and Puebla were added as scion varieties. The earlier work was based on less extensive trials. Since avocado seeds cannot be stored for long periods, the seeds used are those available in season. This is the most variable factor in the experiments.

The response varies, as would be expected, with the kind and condition of seed and graftwood used and also the season. Seeds of Guatemalan, and West Indian races or their hybrids have given best results so far. The scion varieties used seem to vary with respect to ease of graft union. The work has not been carried on long enough to establish definite percentages for the various seasons. The best results so far have been secured during the winter months when the percentage for most varieties ranged, from 75 to 95 per cent. At this season of the year the graftwood used apparently formed callus as rapidly as the fractional embryos which led to more effective graft union.

During the mild winter of 1932-33 no difficulty was experienced on account of root disease. The winter of 1933-34 just passed was relatively cooler and response was somewhat delayed. At the time of transplanting some root decay was noticed and this led to loss of part of the plants after transplanting. The decay begins at the base of the roots and the disease apparently travels upward, resulting in the death of the plant when the point of graft union is reached. Mr. Stevens, Plant Pathologist at the Orlando laboratory, is co-operating on experiments to discover the cause and control of this condition. Particular attention will be given to the sprouting medium.

LITERATURE CITED

1. Traub, H. P., and E. C. Auchter. Sprouting and grafting fractional parts of avocado embryos with attached cotyledonous material. *Science* 78:389 - 390. 1933.

2. Traub, H. P., and E. C. Auchter. Propagation experiments with avocado, mango and papaya. Proc. Amer. Soc. Hort. Science 1933. 30. 1934.