

TRANSMISSION OF AVOCADO SUNBLOTCH VIRUS BY EMBRYO GRAFTAGE

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The casual agent of sunblotch disease of avocado, presumably a virus, has not been transmitted experimentally by sap or vector inoculations and has no known host other than avocado. The selection of propagative material for production of healthy avocado nursery stock is complicated by absence of, or delayed expression of, symptoms on some infected trees and the existence of trees that are permanent symptomless carriers of the virus. All, or nearly all seedlings derived from the latter kind of tree, are infected through seed transmission. Like the parent tree, these seedlings are also symptomless carriers and, if used as rootstocks, cause infection of the scion growth.¹

In the production of virus-free nursery trees it is necessary to establish usable budwood and seed sources by graft inoculating from prospective parent trees to a series of small avocado seedlings grown for that purpose. The incubation period in inoculated seedlings, i.e., time required for symptoms to appear, under glasshouse conditions, has ranged from two months in rare instances to more than two years. With that situation it is advisable to use a large number of seedlings for each test in order to obtain reliable results and to shorten the time required for completing the tests. In the certification program in California, 15 seedlings are inoculated from each candidate parent tree. The time and labor involved in the care of avocado seedlings before and after inoculation are significant factors but efforts to improve the indexing technique have been largely unsuccessful.

This paper describes embryo graftage inoculation of avocado seeds prior to, or at the start of germination, following a propagation procedure described by Traub and Auchter² who demonstrated successful grafting of avocado scions into the fractional parts of the embryo remaining on cotyledon halves of split seed.

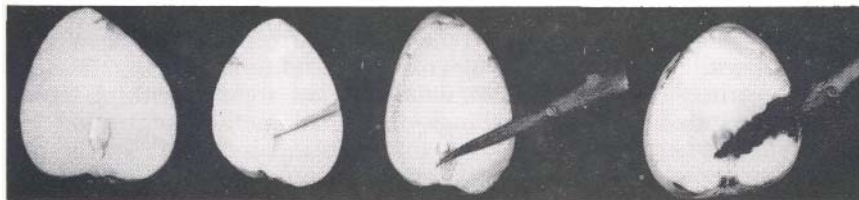


Figure 1. Sunblotch inoculation of avocado embryos.

In these trials, 21 halves of Fuerte avocado seeds were inoculated from a sunblotch source in the manner illustrated in figure 1. A narrow wedge of tissue was removed from

the inner part of the cotyledon (half seed) extending from the outer edge into the center of the remaining embryo portion, carefully avoiding injury to the upper plumule tissue.

Scions from sunblotch infected sources, 3-4 inches in length, were cut to match the wedges removed from the cotyledons. These were fitted firmly in place with the thinned points reaching into the center of the fractional embryo.

Some of the seeds used had begun to germinate and had roots 1-2 inches long but had made no stem growth. In some of these the inoculation scion was placed in the embryo portion but in three instances a small wedge of inoculum tissue was grafted directly into the developing roots.

After the scions were in place, the exposed cut surfaces were coated with warm commercial grafting wax. The half seeds were placed in a medium of 1/3 peat moss and 2/3 plaster sand in a cutting chamber with a constant bottom heat of 72° F. As soon as the germinating seedlings reached 3-5 inches each was transplanted to a container in a greenhouse. A high percentage of the grafted inoculation pieces remained alive.

As the inoculated seedlings developed they were examined regularly for symptoms of sunblotch. Table 1 summarizes results of these trials.

TABLE 1. Sequence of symptom development on seedlings developed from graft-inoculated seeds.

<i>Condition of seed and type of inoculation</i>	<i>No. of half seed inoc.</i>	<i>Total number seedlings showing symptoms (days after inoculation)</i>							
		45	51	85	88	99	147	213	564
Dormant									
Inoculation of embryo	8		1	2	2	3	3	3	3
Slight root sprouting									
Inoculation of embryo	10				1	2	3	5	7
Slight root sprouting									
Inoculation of root tissue	3	1	1	1	1	1	2	2	2
Totals	21	1	2	3	4	6	8	10	12

At the conclusion of these tests, approximately 18 months after the inoculations were made, 12 of 21 (57 per cent) of the seedlings had developed sunblotch symptoms. Two of the infected plants developed symptoms within 51 days after inoculation. This is shorter by 10 days than the earliest observed symptoms on the new stem growth of inoculated, decapitated avocado seedlings, the usual method of testing for sunblotch. But because many of the embryo inoculated seedlings did not develop sunblotch symptoms until several months, and others had not shown evidence of infection after approximately 18 months, there would appear to be no particular advantage in using embryo inoculation as a method of indexing for sunblotch virus. It can be concluded that this is true from the standpoint of incubation period and infection percentage but the embryo inoculation technique has the advantage of eliminating two or three months preinoculation care of avocado seedlings. Additional experience with this method of inoculation is needed before it can be fully evaluated. It is of scientific interest to learn that the sunblotch virus can move across a graft union between a woody stem and

embryo tissue and cause characteristic symptoms of the disease on the seedling that develops from the fractional embryo. There may be occasions when this method of indexing for sunblotch would be useful.

¹ Wallace, J. M., and R. J. Drake. 1962. *A high rate of seed transmission of avocado sunblotch virus from symptomless trees and the origin of such trees. Phytopathology* 52: 237-241.

² Traub, H. P., and E. C. Auchter. 1933. *Propagation experiments with avocado, mango and papaya. Proc. Amer. Soc. Hort. Sci.* 30: 382-386.