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PRELIMINARY INVESTIGATION OF "RESIDUAL JUVENILITY" IN AVOCADO SEEDLING STEMS

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The following article is published with the purpose of stimulating more extensive research on the subject of clonal rootstocks. Mr. Gillespie has given much thought and some time to the study.

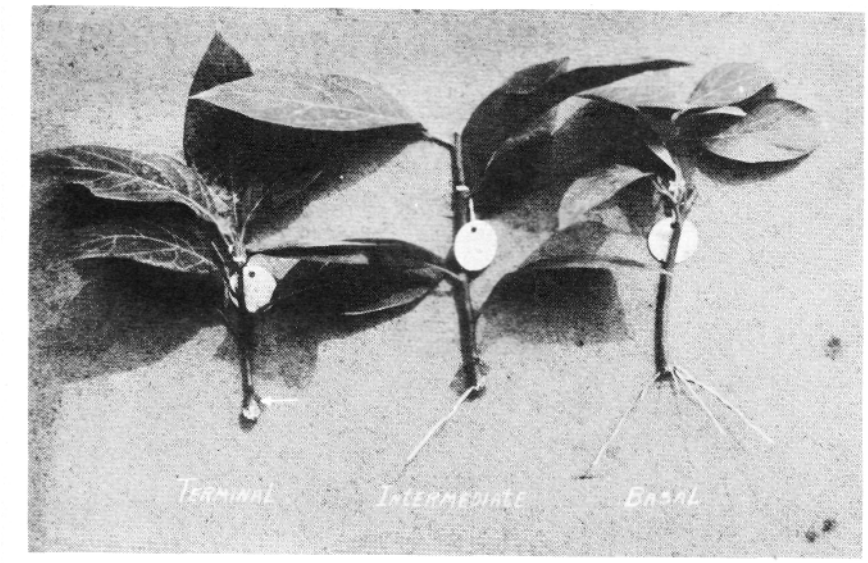
Editorial Committee

Failure, ordinarily, is not conditionable into good reporting material, unless something in the failure leads to further work that may, in turn, become of value. On February 14, 1954, with the consent of Mr. Kenneth Casper of Yorba Linda, Orange County, certain highly productive Fuerte avocado trees in his grove were partially girdled. This, in order to force into growth latent buds on the stem of the rootstocks; of unknown seedling variety, in order to obtain these stem tissues for research purposes. (Ref. 1.)

However, due to ignorance, the recovered tissue was budded upon the stems of "portable" nursery stock of the Fuerte variety. By so doing, the "juvenile condition" or "state of growth", if present was lost, and the "recovered" material all passed into the "mature phase of growth" before stem cutting propagation could be initiated.

Leafy stem cuttings, taken from avocado plants that are in their "mature phase of growth", as evidenced by the production of flowers, exhibit almost uniform reluctance to root. If and when roots are produced, after 3 to 6 months in the hotbed, they vary from one to few in number, indicate little or no "organization" in their development pattern, and in their early growth *display all the vigor of tired old men.*

It has been known for some time that leafy stem cuttings, taken from young avocado seedlings, take root much faster than cuttings made from mature plants of the species. (Ref. 2) However, the percent of successful rooting, even for young seedlings, appears to be in descending order with the increasing age of the particular seedling. This is expressed not only in the number of cuttings ultimately rooted, but in the time required to root, quantity of roots produced on the individual stems, and in the subsequent growth rate of the individual plants. (Ref. 3)



The three cuttings are from the one shoot, developing from a latent bud in the basal portion of the trunk of a 4-year-old Mexican type seedling. Basal cutting developed 5 roots in 28 days. Intermediate cutting, 1 root in 35 days. Terminal cutting, 1 root starting to break through (arrow) on the 42nd day, through on the 46th day. Photo taken on 42nd day.

As the trunks of avocado seedlings have all, at one time, passed through the "juvenile phase of growth"; and because "residual juvenility" has been demonstrated and reported in other species, it appeared to be "in order" to investigate the presence or absence of this phenomenon in the avocado. Preliminary to further stem tissue recovery, from the Casper trees, the following experiment was initiated.

A four-year-old Mexican type seedling was cut back to one foot in height. Shoots developed from latent buds on the trunk and were allowed to grow until each was long enough to provide three each cuttings, which were designated Basal, Intermediate and Terminal. The cuttings were then placed in a hotbed, with bottom heat controlled at 70-74°F. Humidity automatically controlled so as not to go below 80%. Average (mean) air temperature for the 49 days of the experiment was 64°F.

The "Basal" cutting rooted in 28 days and produced 5 roots. The "Intermediate" cutting produced one-only root on the 36th day. The "Terminal" cutting also produced its one—and only—root on the 46th day. Photo taken on the 42nd day.

The experiment, although limited to one seedling, appears to demonstrate that the "juvenile" condition, as demonstrated in the rooting performance of the cutting material, is present in the latent axillary buds on the basal portion of the trunk. The comparative rooting "time" in the three cuttings discussed, as well as the number of roots produced, would tend to indicate that the amount of this "juvenile" condition, residual in or available to any one latent bud, is definitely limited.

However, the rooting characteristics and growth vigor of avocado stem tissue, when obtained in the "juvenile phase" or condition of growth, in comparison to the senile and

disorganized behavior of the "mature growth phase" rootlings of most varieties, indicates the desirability of continued investigation into this phenomenon of growth. The ultimate objective being, of course, the development of propagational means that will insure the economical production of genetically identical—uniformally vigorous—avocado rootstocks from stem tissue from demonstratedly productive source avocado trees.

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2. Halma, F. F., and E. F. Frolich. An Approach to the Evaluation of Avocado Rootstock Variability. Calif. Avo. Soc. Yrbk. 1952: 154-158.
3. Halma, F. F. Avocado Rootstock Experiments — a 10-Year Report. Calif. Avo. Soc. Yrbk. 1953-54: 79-86. (Last three lines of 2nd paragraph of "Seedling Rootstock Variability") (Page 85)