

## Avocado Rootstock-Scion Studies

### ***Compatibility between avocado and new rootstocks suitable to California is object of plant program***

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The imperative need for new avocado rootstocks—with disease resistance and other desirable characteristics, such as dwarfing habit—is the reason for a program of introduction and establishment in California of many avocado forms and botanical relatives.

The problem of propagation and compatibility in horticultural plants is often complicated and difficult of solution. Experience has shown that predictions concerning the success or failure of combinations of forms or species are unwarranted. Sometimes forms which appear to be related are difficult to graft. Others unite readily but may be short-lived or otherwise incompatible. This is illustrated in the avocado by the behavior of the Lyon and Murrieta Green varieties when grafted on Mexican race rootstocks. These two typical Guatemalan varieties can be grafted on Mexican stock successfully, but the resulting grafted trees are frequently dwarfed or short-lived. The same varieties propagated on Guatemalan or hybrid rootstocks or in combination with Guatemalan or hybrid intermediate stem pieces appear to be quite successful in the few trees of these combinations available for observation.



Fuerte and Hass scions growing on  
*P. floccosa* root.

The opposite condition, apparent compatibility of diverse forms, is illustrated by the combination of the *Persea longipies* and the Mexican avocado—*P. drymifolia*. The former species has a small, thin, glossy leaf, thin willowy branches, and small, very thin-fleshed fruit which appears to be only remotely related to the Mexican avocado, the latter having large leaves and branches and relatively larger fruit. Yet this combination appears to be quite congenial, and *P. longipies* as a scion is among the most vigorous of many observed as a nurselimb.

Observations of these combinations and others in the field and experimental plantings strongly suggest that all combinations between forms and species must be investigated by grafting and budding before definite conclusions can be reached concerning the specific compatibility of any two. Even after a union between two forms has been successfully initiated, the longevity of and the subsequent production from this combination must be determined for a period of years before a conclusion can be reached concerning the ultimate compatibility of specific combinations.

Early avocado rootstock investigations at Los Angeles were concerned with compatibility and included important commercial varieties and several allied botanical forms and relatives. Among the latter were the native bay—*Umbellularia californica*—a distant botanical relative of the avocado; the Grecian laurel—*Laurus nobilis*; and the common camphor tree—*Cinnamomum camphora*. Repeated trials of grafting and budding the avocado on these species resulted in failure.

Subsequent introductions of the swamp bay—*P. borbonia*—native to the Gulf Coast states; *P. lingue*, from Chile; the coyo or chinini—*P. schiedeana*; *P. nubigena*, of Guatemala; and *P. melanocarpa*, from Mexico, provided new materials for the study. The coyo, *P. nubigena*, and *P. melanocarpa* were readily propagated on avocado. However, complete failure resulted from all attempts to grow the swamp bay and *P. lingue* on avocado root or to obtain the reciprocal combinations.

Recent collections from Central America, Mexico, Peru, and Puerto Rico have provided additional materials for further study of this problem.

Introductions of new avocado materials from foreign countries frequently are made as scions. These are usually topworked into nurse trees for fruiting, which requires a variable time period.

In order to quickly multiply the material for testing purposes, it is frequently necessary to root cuttings from the nurse-limb introduction. A method for rooting these materials has been developed which utilizes etiolation of the stem section which causes the roots to form.

Attempts to graft some combinations have met with varying degrees of success. The following species have been grafted or budded easily and successfully on avocado: *P. floccosa*; *P. longipies*, *P. schiedeana*, *P. gigantea*, *P. nubigena*, and *P. melanocarpa*. The introduced forms Parramos, Coscometepec, Tochimilco, Maltrata, Santa Engracias, Chimaltenango, Acultzingo, Chichoy, Comyagua, Prior, and Aguacate mico are easily grown on the common avocado.

Other combinations have failed regardless of efforts to combine them by budding or



*Persea* species utilized in compatibility experiments with avocado. Left to right: Coyo—*P. Schiedeana*—from Guatemala; swamp bay—*P. borbonia*—from Louisiana; *P. indica*, from Canary Islands; and *P. gigantea*, from Honduras.

grafting and by utilizing the species either as rootstocks or scion in combination with the avocado. Among those which appear to be completely incompatible with the avocado by ordinary methods of propagation are the swamp bay—*P. borbonia*—*P. indica*, *P. skutchii*, *P. lingue*, the California bay, the Grecian laurel and the common camphor tree.

Because of its apparent resistance or immunity to the causal organism of avocado root rot—*Phytophthora cinnamomi*, the swamp bay—*P. borbonia*— has been of especial interest as a potential rootstock for use in soils which have poor drainage or which are infected with the cinnamon fungus. Numerous attempts to graft or bud the avocado on *P. borbonia* have failed. Some buds of this combination have remained alive for more than a year but never developed beyond the length of ½” The rather distant botanical relationship of this species of swamp bay to the avocado—*P. americana*—apparently precludes congeniality between the two. Other species, such as *P. gigantea*, *P. nubigena*, *P. floccosa*, *P. longipies*, *P. schiedeana* and the form Aguacate mico, which are quite easily grafted on avocado, have also been found impossible to graft on *P. borbonia*, indicating a condition of incompatibility between these forms.

While *P. indica* and *P. lingue* have been shown to be incompatible with the avocado, these two species have been successfully grafted on swamp bay—*P. borbonia*.

One objective of these studies is to obtain an intermediate or sandwich stem piece which is compatible both with the avocado and disease-resistant or dwarfing rootstocks.

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