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.

The opposite condition, apparent compatibility of diverse forms, is illustrated by the combination of the Persea longipilia 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. longipilia as a scion is among the most vigorous of many observed as a nurse-limb.

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.

Concluded on next page
Chloride Toxicity in Avocados

In many avocado orchards, the tips of the leaves—and in severe cases the leaf-margins also—become brown as the leaves reach full maturity. Tissue-yellowing usually precedes the leaf-burn, and the extent of leaf-burn depends on the nature of the seedling variety and concentration of chloride in the leaf tissue.

As the leaves develop, their accumulating chloride may be very gradual, and often only upon their reaching full maturity will the leaf-burn at the tip—the terminus of the leaf-veinal system—become evident. When the irrigation water contains considerable chloride, the usual practice is to depend upon the rainfall to leach the chlorides to depths below the root zone, but unfortunately an adequate depth of soil, drainage, and rainfall is often lacking. When in addition to an excessive chloride concentration there is also present an excess of sulfate, sodium, and other elements, and an inadequate supply of calcium and magnesium, it is then that leaf injury becomes most severe.

A chloride-affected leaf of a Topa Topa—Mexican variety—avocado seedling grown in a sand culture with a nutrient solution which contained 422 parts per million—ppm—of chloride added as calcium chloride is shown in the picture on this page. Leaf injury from chloride accumulation often results in the premature abscission of the affected leaves.

A preliminary test was made to determine the effectiveness of various forms of ammonia nitrogen in reducing the injury brought about by chlorine. Earthenware containers of three-gallon capacity and provided with drainage were used for sand and soil cultures in the glasshouse. An avocado seedling was

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. flocosa; P. longipes; P. Schiedeaana; P. gigantea; P. nubigena; and P. melanocarpa. The introduced forms Parramos, Coscometepac, Tochiminico, Maltrata, Santa Engracias, Chimaltenango, Acultzingo, Chichoy, Comayagua, Prior, and Aguacate mico are easily grown on the common avocado.

Other combinations have failed regardless of efforts to combine them by budding or 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. flocosa, P. longipes, P. Schiedeaana 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.

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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