

## NO YAS — A THREAT TO THE AVOCADO

**C. A. Schroeder**

*Department of Biology, University of California, Los Angeles*

The changing face of the earth and resultant destruction of flora is evident throughout the world as populations increase, subdivisions are developed and land is cleared for agricultural projects in nearly all countries. This drastic destruction of wild plants in particular threatens cultivated crops in many parts of the world. It is for wild forms of cultivated crops that plant explorers search, as these provide new genetic sources of disease resistance and possibly new varieties for our established crop industries. Numerous examples of widespread destruction of wild forms of wheat, rye and other cereal crops can be matched with comparable examples of destruction for wild woody crop plants which were formerly widespread and are now few in number or possibly extinct. Perhaps the avocado may soon join this list of threatened species.

An example of a threat to the future of the avocado can be illustrated by an incident experienced while visiting recently in Costa Rica. A continued interest in all aspects of avocado, including the study of botanical relatives which provide fruit or which are of potential use as rootstocks for our presently cultivated varieties, has provided an opportunity to travel through Central America on many occasions in the past thirty years. One constantly looks for specimens of avocado and related species in the field in hopes of learning something new of their characteristics, their behavior and use by local or native peoples in various localities. A very close botanical relative of our cultivated avocado, *Persea scheideana*, is among those species of interest. It is known locally under various names such as coyo, yas, or chinini in the Central American countries from southern Mexico to Panama. The local name of "yas" in the Turrialba area of Costa Rica aroused my curiosity, as there is a small community named El Yas in the beautiful valley of the Reventazón River near the larger town of Cartago.

As one explores the valley of the Reventazón River some 6 kilometers east of Pariso or 12 kilometers east of Cartago, perhaps the closest remaining trees of Yas, *Persea scheideana*, are 15 kilometers directly north. A sign pointing to El Yas is seen on the main highway east of San Jose en route to Turrialba (Figure 1). As one departs from the highway and descends the narrow twisting road toward the river he comes upon a small community consisting of several small homes hidden among the dense lush foliage of this tropical climate. There is a "wide spot" in the road where three or four wooden frame homes are close to the road, one of which is the local "tienda" or store that supplies the local population with basic processed foodstuffs, so the people do not need to travel ten miles to the nearest major highway and proceed another twenty miles to the supermarket, hardware store or gasoline station. The people of El Yas raise their own vegetables and maize and a few produce some coffee. There are the occasional papaya plants, several mangos, guavas, wild plums, passion fruits and other tropical

tree crops with delightful fruits but no yas. One would conclude that possibly the community name of El Yas might have been acquired from the fact that the yas tree was common in the area. This apparently was the case many years ago when the valley was less exploited to field crops of sugar cane, maize and other extensively grown species. All the native woody species were removed from the area to provide cleared land for the then newly introduced crops, including coffee. It was within the memory of some persons that yas trees were still growing on the hillsides and in the fields nearby, but now the nearest "yas" specimens can be found only higher up the mountainside on the upper southern slopes of the Volcan Irazu. This situation proved to be correct for later it was possible to drive into some of the communities above the main highway within a few miles of the steep southern slopes of the volcano where indeed the yas was growing wild.

In the very steep canyons and along the roadsides where the fields of potatoes and lumbering operations had stopped short of completely clearing the land, there remain fine old specimens of yas and other close botanical relatives belonging to the family Lauraceae.

While the yas or coyo, *Persea scheideana*, produces a fruit the quality of which is less than most of our currently accepted horticultural varieties, nevertheless some of the trees yield attractive fruits of fair to good quality and are very much accepted by the local people. Very little study has been directed toward fruit improvement in this species, though it may have potentialities as a good fruiting species under some circumstances.

The local names for *Persea scheideana* are numerous in Central America and are sometimes confused even by local people and especially by visitors. Yas is commonly used throughout Costa Rica for this species. This is equivalent to the chuti (Honduras), chinini (southern Mexico), coyo (Costa Rica) and coyocte or chucte (Guatemala) (7, 12, 13). Additional confusion sometimes results in Costa Rica when one encounters an entirely different fruit, the Yos, *Sapium* spp., a member of Euphorbiaceae, or the Ya, a term applied to *Achras zapote* (Sapotaceae), which is the chicle tree providing the chewing gum base from its milky sap.

The major potential value of the yas is related to its possible use as a rootstock for regular avocado clones. The preliminary evaluation of yas in respect to disease resistance, especially the possible tolerance of *Phytophthora cinnamomi* by some of the seedlings which have been tested, indeed suggests that a much greater indexing of seedlings of the species should be made.

The yas or coyo has not been fully explored as a potential root-stock, particularly in the United States, possibly for several reasons. Firstly, very few specimens have been introduced or successfully cultivated to a stage of fruition and these few have been considered inferior mostly from the point of view of fruit quality. Moreover the few specimens observed, at least in California, have proved somewhat difficult to propagate. Likewise, a few attempts to propagate the species in Honduras appeared to be discouraging (3). The species in South Africa, however, has proved to provide an excellent rootstock for Fuerte and Hass (10), though there was a single introduction from California made into that country from which an abundant fruit crop provided seed

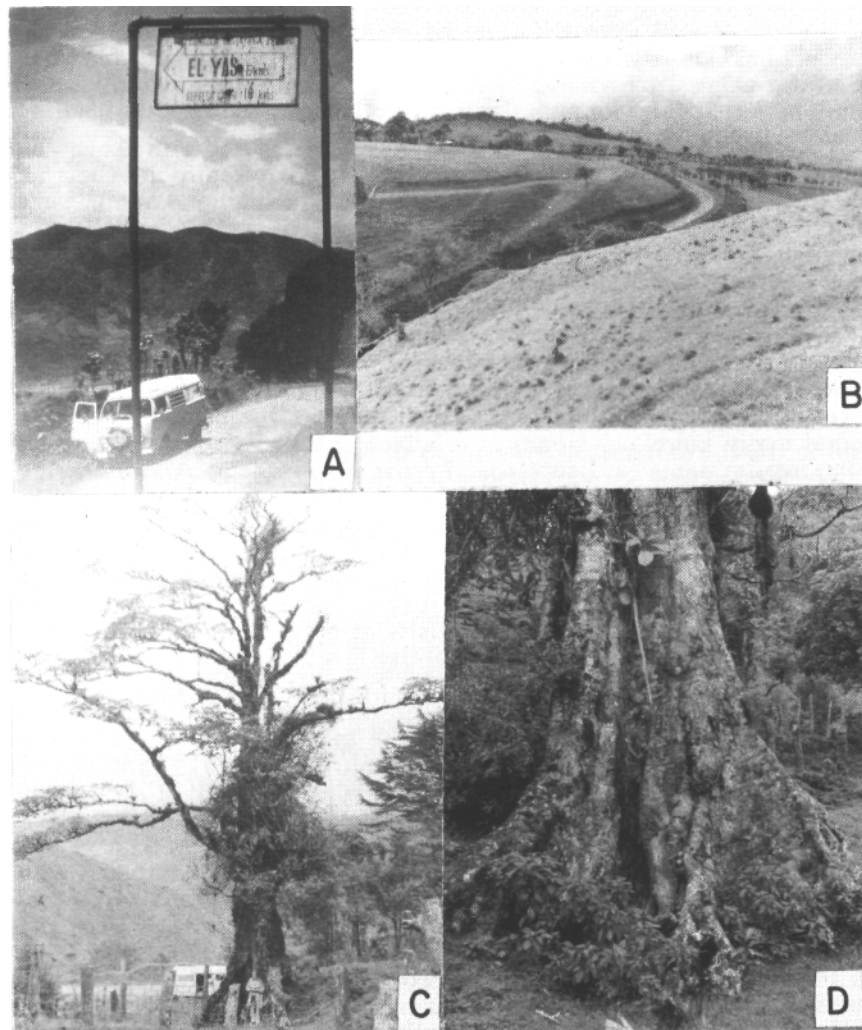
for the rather extensive propagation trial. This incident points to the fact that possibly a particular seedling line can be easily propagated or that the local environmental conditions or the techniques of the local propagator made the propagations a success.

The yas or coyo in Costa Rica still can be found in some of the virgin and second growth forests where intensive removal of tropical timbers has not yet cleared the landscape. These remnants of formerly beautiful tropical forests can be seen along the Pan American Highway south of San Jose en route to the Panamanian border.

As one proceeds eastward from San Jose via the Pan American Highway toward Cartago there is a turnoff to San Ysidro del General, a town which lies beyond the Cerro de Muerto, the high mountain range that reaches an altitude of 10,000 feet. Approximately 4 miles or 6.4 kilometers south of the turnoff the road ascends upward through cut-over forest mountain slopes. A few gnarled and broken trunks of former giant tropical timber trees dot the hillsides, now planted to maize, vegetable crops, or which have reverted to scrubby bushes of secondary growth. One gains altitude on the well engineered highway to a level of 6000 feet and a distance of 12 miles or 18.2 kilometers from the turnoff. Here is the community of Los Loreles where, as the name implies, are found many laurels or botanical relatives of the avocado, whose scientific family name is Lauraceae. *Persea*, *Ocotea*, and *Nectandra* are genera in the family Lauraceae represented in these mountain forests. It is a rather unusual forest in respect to species composition as there are many genera and species of trees but comparatively few of any given kind. Our temperate zone forests are usually dominated by a single species of pine or perhaps the great redwood or other species in a given area, but in tropical forests the diversity of types is great and the individual trees of a given type are generally few in number and scattered. There is no dominant species in most cases. It is an interesting fact that a high percentage of the species in this area belong to the family Lauraceae, hence one looks here for the so-called wild avocado. The area has been visited many times by avocado explorers (14) and several species have been introduced into California as the result of these expeditions. One often has difficulty in the identification of the large specimens in such tropical forests as the diagnostic branches with leaves, flowers and fruits are frequently very high up and intermingled with adjacent trees to make uncertain their association with any given tree trunk. Occasionally bark characters such as surface configuration, texture, color, taste and thickness (1) may provide a helpful suggestion of identity or the occasional root sprout which sometimes appears on specimens which remain near clearings. The fine old examples are difficult to photograph as they are large and their tops completely mixed up with canopy of other species. The only photogenic aspect is the spectacular buttress of some isolated, exposed specimens which have been spared in land clearing operations (Figure 1).

While sporadic clearing of small areas of tropical woods has occurred at Los Laureles, there still remain along the clearings and in the almost inaccessible ravines fine old specimens of the Yas, *Persea scheideana*, and to a lesser extent *Persea rigens*. The latter is not well known and possibly has not been observed under cultivation, for it is a truly "wild avocado" with a small fruit 1½ to 2 inches in diameter, apparently without much quality to attract attention. The larger fruited yas, however, is found here as an occasional specimen of very great size. One of the helpful identifying characters of the

yas leaf is the presence of leaf galls on most specimens. Leaf galls are characteristic of many *Persea* species throughout Mexico and Central America and are useful in distinguishing *Persea* leaves from other broad-bladed leaves in the canopy of a forest. The yas is a well known fruit in several areas of Costa Rica and Guatemala. Standley (12, 13), who made many early studies of botanical materials in Central America, noted "they (the yas) are usually left when the forest is cleared and often are plentiful in pastures."



A. The road to El Yas, east of Cartago, Costa Rica.  
 B. Barren hills of formerly forested area along road near El Yas, Costa Rica.  
 C. Isolated specimen of *Persea scheideana* (yas, coyo, chinini) in clearing near Las Loraes, Costa Rica.  
 D. Buttress of old *Persea scheideana* near Los Loraes.

Skutch (11), a distinguished botanist and biologist who has spent most of his life in and near Costa Rica, has written a fine account of the general biology of Costa Rica. He has described the general region of El General and the destruction of the forests nearby. He states, "Of the once magnificent wilderness only shreds and patches remain in the

valley and on the surrounding slopes below four or five thousand feet." He continues to discuss "the destruction of the forest which is occurring at an accelerated pace all over Costa Rica." It is near the area of El Cerro de la Muerta and the open paramos of the Cordillera de Tolamanca that Los Lorales is located. The pressures of land clearing and development are prominent in the entire region, hence the threat to many tropical forest species including *Persea* is real and continuing.

While the occasional visitor in Central America becomes aware of rather dramatic changes which become visible in the landscape from time to time, it is the observations of those who have been more intimately associated with the area which are indicative of the basic problems that beset the region.

Paul Allen (1) traveled and botanized in Central America for more than two decades. He witnessed firsthand the significant reduction or threat of extinction of much native flora in many countries. He recorded in his most fascinating account of the Oso Peninsula area of Costa Rica: "Unfortunately, in many parts of Costa Rica, particularly in the adjacent General Valley, the forest stands are being destroyed just as rapidly as people can get to them. Many invaluable stands are felled for cash crops of rice or corn worth only a fraction of the market price of the lumber destroyed, and other even more extensive tracts are deliberately killed with fire to provide pasture."

The flora of many communities in Latin America are indeed in jeopardy in respect to some species of presently rare plants. Conceivably this threat can easily be extended to many more plant species which are now comparatively common or plentiful. A recent international symposium of knowledgeable persons concerned with this specific topic has listed certain plants that have come within a very narrow margin of extinction, never to be seen again on this earth. Two species which are botanically very close to the avocado are listed: *Persea theobromfolia* in Ecuador (4) and *Persea lingue* in Chile (8). Man has very little knowledge of the value of these two *Persea* species as they might be used as a genetic material to improve the quality of our present avocado varieties or for rootstock to support our known varieties.

A sobering evaluation of plant destruction and the loss of valuable flora in Panama and Central America is discussed by D'Arcy (2). He shows how the use of fire for clearing land to facilitate hunting and preparation for growing maize for 5000 years has reduced some species to rarities. The use of steel tools, the intensive agriculture for coffee, sisal, and sugar production and the parallel population pressure on the once lovely, lush tropical wildness, has in many instances resulted in essentially barren landscapes, this within the memory of many men still living.

## LITERATURE CITED

1. ALLEN, P. 1956. The rainforest of Gulfo Dulce. Univ. of Florida Press, Gainesville.
2. D'ARCY, W. G. 1977. Endangered landscapes in Panama and Central America. In: Extinction is Forever. New York Botanical Garden, pp. 89-104.
3. FIESTER, D. 1949. The coyo: a root stock for the avocado. Calif. Avocado Soc, Yearbook 34; 27-31.
4. GENTRY, A. H. 1977. Endangered plant species and habitats of Ecuador and

- Amazonian Peru. In: Extinction is Forever. New York Botanical Garden, pp. 136-149.
5. KOPP, L. E. 1966. A taxonomic revision of the genus *Persea* in the Western Hemisphere (Persea-Lauraceae). Mem. N.Y. Bot. Gard. 1-117.
  6. LEON, J. 1968. Fundamentos botánicos de los cultivos tropicales. Inst. Interamer. de Ciencias Agri. de la O.EA, San José, Costa Rica.
  7. PITTIER, H. 1908. Las plantas usuales de Costa Rica. H. L. and J. B. McQueen, Inc., Washington, D.C.
  8. PIZARRO, C. MUNOS. 1977. Threatened and endangered species of plants in Chile. In: Extinction is Forever. New York Botanical Garden, pp. 251-253.
  9. POPENOE, W. 1934. Manual of tropical and subtropical fruits. Macmillan Co., N.Y.
  10. SCHROEDER, C. A. 1974. *Persea scheideana*—the coyo—a possible rootstock for avocado in South Africa. Calif. Avocado Soc. Yearbook 57: 18-23.
  11. SKUTCH, A. F. 1971. A naturalist in Costa Rica, Univ. of Florida Press, Gainesville.
  12. STANDLEY, P. C. 1931. Flora of the Lancetilla Valley, Honduras. Field Mus. Nat. Hist. (Chicago). Pub. 283. Bot. Ser. Vol. X.
  13. STANDLEY, P. C. and J. A. STEYERMARK. 1946. Flora of Guatemala. Field Mus. Nat. Hist. (Chicago). Fieldiana. Bot. 24, pt. 1.
  14. ZENTMYER, G. A and E. SCHIEBER. 1976. Exploring for *Persea* in Costa Rica. Calif. Avocado Soc. Yearbook 60: 172-175.