

***Araucaria heterophylla* and *Pinus caribaea*: potential Christmas trees for Puerto Rico¹**

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ABSTRACT

Araucaria heterophylla was the most promising of six evergreen species tested for suitability as Christmas trees. *Pinus caribaea* var. *hondurensis* may also be usable. *Callitris intratropica*, *Casuarina equisetifolia*, and *Cryptomeria japonica* grew well but had poor appearances, and *Pinus echinata* failed.

INTRODUCTION

Christmas trees, a traditional part of the holiday celebration for many families in Puerto Rico, are not grown commercially on the island. In recent Decembers local newspapers featured articles about trees imported from Canada or the United States mainland. These articles show that the price of an average 6 foot (1.8m) tree—increased from less than \$20 in 1976 to \$35 or more in 1979, that the trees are often misshapen or have sparse foliage, and that either too few or too many trees have arrived.³

If suitable trees could be grown in Puerto Rico, the price to consumers could be lower, and the money spent for imports would remain on the island and benefit local landowners and workers. Also, trees would be fresher because they could be cut much closer to the time of use. And the number of trees cut could be more accurately matched to the demand. One island economy, Hawaii, has already coped by growing *Araucaria heterophylla* as a Christmas tree for more than 15 years.^{4,5} This species and others were planted by the Institute of Tropical Forestry, in cooperation with the Agricultural Experiment Station of the University of Puerto Rico, to test the possibility of growing Christmas trees in Puerto Rico. This note reports the results of the trial

MATERIALS AND METHODS

The following six evergreen species were used: *Araucaria heterophylla* (Salisb.) Franco; *Callitris intratropica* R. T. Bak. et H. G. Sm.; *Casuar-*

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³ San Juan Star. Articles and photos dated Dec. 12, 1976; Dec. 12, 1977; Dec. 3, 1978; and Nov. 29, 1979.

⁴ LeBarron, Russell K., 1965. Growing Norfolk Island Christmas trees in Hawaii, Coop. Ext. Ser., Univ. Hawaii, Misc. Publ. 23.

⁵ Fullaway, David T., Tom K. Tagawa, Eduardo Trujillo, C. J. Davis, A. A. La Plante, and Ernest Pung, 1972. Norfolk Island Pine culture, Coop. Ext. Serv., Univ. Hawaii, Circ. 453.

ina equisetifolia L.; *Cryptomeria japonica* (L.f.) D. Don; *Pinus caribaea* var. *hondurensis* Barrett et Golfari; and *Pinus echinata* Mill.

The test trees were planted between October 1970 and July 1971 at the Corozal Agricultural Substation in north-central Puerto Rico, on land typical of what might be available for growing Christmas trees. The site is in the Subtropical Moist Forest ecological life zone⁶ and has an annual rainfall of about 2000 mm. Elevation is about 150 m above sea level, and aspect is south to southwest. The soil is Lares clay, a deep, moderately well-drained, very strongly acid soil, classified as a clayey, mixed, isohyperthermic Aquic Tropohumults.⁷

Eighty seedlings of each species were planted at a spacing of 1.5 by 1.5 m in four plots of 20 trees each. The seedlings averaged 17 to 22 cm in height after planting except for the *Casuarina*, which had an average height of 40 cm. Some trees in two plots of each species were later experimentally sheared, although this was not done often enough to allow definite recommendations to be made for the various species. But to avoid any bias from the shearing, we determined survival and height growth only in the unshaired plots.

RESULTS AND DISCUSSION

After 2½ to 3 years of growth, only *Pinus echinata* had not survived and grown reasonably well. *Araucaria heterophylla* was the most promising species. It had 72.5% survival, and grew an average of 73 cm per year in height. It has a naturally pyramidal and symmetrical form (fig. 1), and shearing induces division of the branch ends if a fuller appearance is desired. The foliage retains its healthy green color for more than a month after the tree is cut. A 2 to 3 m tree can be produced within 3 to 4 years after outplanting. If two whorls of live branches are left on the stump when the tree is cut, sprouts will produce a new tree in even less time.⁵ This sprouting can be repeated several times as long as the stump remains healthy. A possible disadvantage is that *Araucaria* lacks the resinous odor characteristic of firs, pines, and spruces. However, the increasing acceptance of artificial trees, and of trees that have been sprayed with simulated snow or other coatings, indicates that many consumers may be willing to sacrifice aroma for stylized tree form.

Pinus caribaea, with 92.5% survival and 97 cm average annual height growth, has a healthy green color, a reasonably tapered shape (fig. 2), and a resinous odor. But it has widely spaced branches and long needles, which may be less attractive to consumers than the traditional compact

⁶ Ewel, J. J., and J. L. Whitmore, 1973. The ecological life zones of Puerto Rico and the U.S. Virgin Islands, USDA For. Serv. Res. Pap. ITF-18, 72 p. plus map.

⁷ Lugo-López, M. A. and Luis H. Rivera, 1977. Updated taxonomic classification of the soils of Puerto Rico, Agric. Exp. Stn. Univ. P.R. Bull. 258.

and short-needled firs and spruces. Shearing could reduce the spacing between branches, but would need to be done several times a year to be effective. Also, this species tends to dry out rather rapidly after it is cut, even if the base is kept in water, and becomes a fire hazard after two to three weeks. However, it is more widely adapted in Puerto Rico than is *Araucaria*, and the tops of trees removed in plantations for posts or



FIG. 1.—*Araucaria heterophylla*.

other purposes could be sold as Christmas trees if cutting is done just before the holiday season.

The other three species that survived and grew well were unacceptable as Christmas trees because of their appearance. *Casuarina*, with 100% survival and more than 300 cm annual height growth, is sparse and feathery because of its fast growth (fig. 3), and its foliage tends to be gray-green in color. The experimental shearing showed that growth can be controlled to produce a more compact tree, but the shearing would

need to be repeated at least every two to three months because of the rapid growth rate. *Callitris*, with 77.5% survival and 86 cm annual height growth, has many ascending branches that make it look bushy and multi-stemmed, and the foliage is at the ends of the branches so that the base of the tree appears bare (fig. 2). *Cryptomeria*, with 77.5% survival and 55 cm annual height growth, lacks the tapered shape of the classical Christmas tree because it is narrow for its height (fig. 2), and the foliage is yellow-green.



FIG. 2.—From left to right. *Araucaria heterophylla*, *Callitris intratropica*, *Pinus caribaea*, and *Cryptomeria japonica*.

Pinus echinata had only 32.5% survival with an average annual height growth of only 36 cm.

Both *Araucaria* and *Pinus caribaea* can produce usable Christmas trees in three to four years, at a density of at least 2767 trees per hectare (1097 per cuerda), allowing space for access roads and mechanization. Further trials are needed to determine the adaptability of *Araucaria* to other sites in Puerto Rico, and to adapt the cultural techniques developed in Hawaii^{4,5} to local conditions.

Also, *Araucaria* seeds are large and perishable, and there is at present no local source of supply. Both species will require periodic weeding until the young trees have outgrown competing vegetation. Thus, probable



FIG. 3.—*Casuarina equisetifolia*.

costs and returns of plantations as well as consumer acceptance of the trees produced still need to be determined.

RESUMEN

Araucaria heterophylla fue la especie más prometidora de las seis especies siempre verdes examinadas para conveniencia como árbol de Navidad. *Pinus caribaea* var. *hondurensis* podría ser utilizable también. *Callitris intratropica*, *Casuarina equisetifolia* y *Cryptomeria japonica* crece bien pero poseen una apariencia pobre. *Pinus echinata* murió.