

Research Note

SENSORY EVALUATION OF ARRACACHA (*ARRACACIA XANTHORRHIZA* BANCROFT) CULTIVARS IN PUERTO RICO¹

The arracacha plant (*Arracacia xanthorrhiza* Bancroft), also known as Peruvian carrot,² apio criollo,³ batata baroa, racacha, and zanahoria blanca,^{4,5} is a herbaceous perennial that produces large, thick, edible, starchy roots.^{4,6} It is one of the largest of the cultivated umbellifers,^{4,5,7} and a common food crop of South America. The specific place of origin is attributed to the Andean Region, which comprises portions of Perú, Ecuador, Colombia and Bolivia.^{7,8,9} Aside from the Andean Region, arracacha is grown in Venezuela,^{6,6} Jamaica, Puerto Rico, Costa Rica, Guatemala,^{6,8} Brazil,^{8,9} Panamá, Haiti,⁹ Mexico and parts of Africa.^{4,6} Optimal climatic conditions for its cultivation include 15-20° C temperatures,^{4,5,7} altitudes from 1,800 to 2,600 m above sea level, and 60 to 100 cm annual rainfall. The crop prefers well-drained soils with pH between 5.0 and 5.5.^{4,6} In Puerto Rico, the arracacha has adapted well to the

existing climate and deep clay soils (mostly Ultisols) of the central mountains near Baranquitas and Orocovis. It is commercially grown there, even though average temperature is higher than 23° C and altitude is less than 900 m above sea level.¹⁰

In appearance, arracacha resembles the celery plant (*Apium graveolens* L.), another of the cultivated umbellifers. This resemblance to celery has resulted in local Spanish applications of the name "apio," especially in Venezuela, Ecuador and Puerto Rico.^{7,11} Reyes-Zavala⁹ reports that its nutritive value is superior to that of potato (*S. tuberosum* L.) and carrot (*Daucus carota* L.), because it is high in the vitamin B-complex. It is also rich in calcium and phosphorus, and its starch content ranges from 10 to 25%.⁶ The starch is a complex carbohydrate easily digested and can be used in foods for infants and physically-handicapped persons.^{6,9}

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²Anonymous, 1987. Ingreso Agrícola de Puerto Rico 1986-87. Commonwealth of Puerto Rico, Department of Agriculture, Santurce, P.R.

³Purseglove, J. W., 1974. Tropical Crops—Dicotyledons. Longman, England, pp. 648-9.

⁴Kay, D. E., 1973. TPI Crop and Product Digest No. 2. Root Crops. Tropical Products Institute, London, pp. 29-32.

⁵Montaldo, A., 1972. Cultivo de raíces y tubérculos tropicales. Instituto Interamericano de Ciencias Agrícolas de la OEA, Lima, Perú, pp. 137-43.

⁶National Academy of Sciences, Washington, D. C., 1975. Root and Tubers—Arracacha, pp. 29-32.

⁷Hodge, W. H., 1954. The edible arracacha—a little known root crop of the Andes. *Econ. Bot.* 8 (3): 195-221.

⁸Jaramillo, A., 1952. La arracacha (La Morfología Botánica) Rev. Fac. Nac. Agronomía (Medellín) 12: 258-61.

⁹Reyes-Zavala, V., 1970. Apio criollo. *El Agricultor Venezolano* 249: 38-41.

¹⁰Olivieri-Cintrón, Luis J., 1985. Evaluación de yerbicidas en apio (*Arracacia xanthorrhiza* Banc.) en dos suelos Ultisoles. Tesis M.S. Departamento de Agronomía y Suelos. Universidad de Puerto Rico, Recinto Universitario de Mayagüez.

¹¹Carrasquilla, J. D., 1944. Datos para la aclimatación de la arracacha en Europa. Rev. Acad. Colombiana Cienc. Exactas, Fis. y Nat. (Bogotá) 5 (20): 470-82.

TABLE 1.—Sensory evaluation and acceptability of four arracacha cultivars

Cultivar	Appearance	Mean values, ¹ for		Overall acceptability
		Flavor	Texture	
Criolla	5.17 a ²	4.33	4.42 ab	4.17 a
I	5.00 a	4.42	4.92 a	4.50 a
A	5.08 a	4.92	4.83 a	4.92 a
E	4.33 b	4.17	4.00 b	4.00 b

N.S.

¹The hedonic scale is defined regressively as follows: 6 = like very much; 5 = like; 4 = like moderately; 3 = neither like nor dislike; 2 = dislike a bit; 1 = dislike.

²Mean values in columns bearing the same letter do not differ significantly ($P > 0.05$).

The "apio" has been grown in Puerto Rico at least since 1903,¹² when it was found planted extensively in the southern mountain regions of Ponce. Although not quantitatively ranked as one of the major root-crop vegetables of Puerto Rico, it is very popular and in great demand when available. Total insular production in 1985-86 was 51,000 hundredweight with a total farm value of 1.05 million (\$US).² Production estimates for 1986-87 total 55,000 hundredweight.²

Very little is known about this crop in Puerto Rico, especially with regard to its cultivation, nutrient needs, cultivars and pest control. In 1980, AES-UPR introduced 12 cultivars from Colombia to expand the insular germplasm base. Only three of the new cultivars have shown favorable cropping potential.

These cultivars are described briefly as follows: Cultivar I: purple foliage and petioles, yellow roots; Cultivar A: light green foliage with red stripes extending from the base of the green petioles to the middle portion of the same section, yellow roots; Cultivar E: light green foliage, the base of petioles purplish, with cream-white roots; and Criolla: light green foliage, green petioles, yellow roots.

Root samples of these cultivars were collected for sensory evaluation. All were obtained from a 1986 planting at Barranquitas. They were evaluated at the AES-UPR Food Technology Laboratory. A trained 12-member taste panel used a six-point hedonic

scale (as accepted by the "American Society for Testing Materials"). The scale ranged from "like very much" to "dislike". Root samples were washed, hand peeled, cut in pieces, and boiled for 20 to 25 minutes in salted water (1 tablespoon/5 cups tap water) until tender. They were evaluated for visual appearance, flavor, texture, and overall "acceptability." Mean numerical values were obtained as averages of two evaluations (12 member \times 2 evaluations = 24 responses) for each cultivar at different sessions. Results of these evaluations were submitted for statistical analysis, employing the Duncan New Multiple-Range test (table 1).

The results indicate that all the cultivars were acceptable. There were significant differences between cultivar E and cultivars A, I and Criolla in appearance and overall acceptability. The highest score in overall acceptability was recorded with cultivar A. With respect to this parameter, all of the cultivars were found acceptable (between "like" and "like moderately"). Texture of each cultivar was found acceptable, although significant differences between them were evident. All the cultivars were acceptable for flavor. On the basis of sensory evaluation, cultivars I and A were the most promising in this evaluation.

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¹²Cock, O. F. and G. N. Collins, 1903. Economic plants of Porto Rico. Contrib. U.S. Nat. Herb. 8: 57-269.