

**PROCESSING ARRACACHA (*ARRACACIA XANTHORRHIZA*
BANCROFT) IN BRAZIL**

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Abstract

Arracacha, a starchy Andean root crop of the Apiaceae family, is cultivated by resource-poor, small-scale farmers in Latin America. Known in Brazil as *mandioquinha-salsa* and reputedly of good digestibility, it is used for direct consumption in non-sweet foods and desserts. It is widely cropped, growing on an estimated area of 9,000-11,000 ha in the southern uplands of Brazil, where the ecological requirements are met during the growing season of 10-12 mo. It's distinctly umbelliferous aroma, attractive texture, high carotene content, and its particular, but as yet poorly understood, functional starch properties have aroused the interest of the processing industry. Nestlé-Brazil processes about 400 t of arracacha annually as a component of baby food. Other arracacha products include flour and pre-cooked, dehydrated flakes, which have potential for use in school meals. Preliminary tests have yielded arracacha chips of excellent quality and acceptance, showing a higher chip yield (37%) per raw material wt than potato (20%-22%). Additional advantages included the possibility of direct packing and reduced frying temperatures. The increasing use and processing in Brazil contrast with the decline of arracacha in the Andes, despite its high agricultural and industrial potential.

Introduction and Objectives

Arracacha (*Arracacia xanthorrhiza* Bancroft) is one of several native starchy root crops and still largely restricted to the Andes. The vegetatively reproduced crop belongs to the Apiaceae (Umbelliferae) and is used mainly for direct consumption in non-sweet foods and desserts. Throughout its range of adaptation, arracacha is cultivated mostly by resource-poor, small-scale farmers. The crop is widely used in Andean subsistence agriculture, but significant commercial cropping is restricted to subtropical locations in the northern Andes (Ecuador, Colombia, and Venezuela) at altitudes of 1800-2000 m.

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Introduced to Brazil probably 100 years ago, arracacha has since developed into a significant horticultural operation, currently grown on 9,000-11,000 ha in the southern uplands, particularly in the states of Minas Gerais, Paraná, Santa Catarina, and Espírito Santo. During the growing season (10-12 mo), arracacha requires absence of frosts and moderate summer temperatures. These conditions are met at altitudes of about 1000 m, between latitudes 18° and 25° S (Santos 1993). Arracacha is considered a robust crop, little affected by pests and diseases, but its long crop duration, narrow genetic base, and reduced shelf life of its roots are regarded as limitations (Hermann 1991). Another serious constraint is post-harvest deterioration, caused by *Erwinia* sp. and the fungus *Rhizopus* sp. (Henz et al. 1991).

Arracacha is grown by resource-poor farmers in the southern uplands of Brazil, with an average area of less than 1 ha dedicated to the crop (Santos 1993). A list of some of its features follows:

Cultivated area:	9,000-11,000 ha
Average area planted/farmer:	Less than 1 ha
Latitude range:	16-25° S
Altitude range:	800-1200 m
Ecological requirements:	1000 mm rainfall, moderate summer free of frosts
Yield (minimum inputs):	8 t/ha

Production inputs amount to only a small fraction of those for potato. Arracacha cultivation is labour-intensive and therefore unattractive to large-scale farmers (Hermann 1991). Morphological and agronomic data suggest that all arracacha produced in Brazil is derived from only one genotype (Zanin and Casali 1984).

Known in Brazil as *mandioquinha-salsa*, arracacha has good digestibility and a good reputation as infant food (Santos et al. 1991). It is also used in soups during the coldest months. A highly prized vegetable in urban supermarkets, retail prices of washed roots average US\$1.50/kg; the farm gate price may reach US\$1.00/kg (Hermann 1991). Recent data suggest that the area planted to arracacha is still expanding, even into the dry *cerrado* uplands of Goiás State and the Federal District of Brasília, previously thought to be unsuitable for the crop (Santos 1993).

Arracacha's distinctly umbelliferous aroma; attractive texture; high carotene content, which gives yellow or orange pigmentation to some genotypes; and its particular, but as yet poorly understood, functional starch properties have aroused the interest of the processing industry.

This paper provides data on the status of arracacha processing in Brazil, particularly with regard to chips—a promising alternative to traditional arracacha consumption.

Methods

The status of arracacha cultivation in Brazil was assessed during 1992-1994, and included interviews with industrial users. In 1992, preliminary tests were conducted at Krebauer Co. (Brasília) to evaluate yield, crispness, and other parameters of chip production. The same steps as for potato chip production were used: washing, peeling, slicing, frying, seasoning with monosodium glutamate, and packing. A test panel of six experienced persons evaluated arracacha and potato chips for crispness and eating quality. Optimal frying temperatures were determined by testing 6-kg lots of roots at different temperatures (140, 150, 160, 170, 180, and 190 °C). Temperature was controlled, using the 1994 Washington State Potato Commission protocol. A promising arracacha genotype (Ipuiuna) from the breeding programme of the Centro Nacional de Pesquisa de Hortaliças (CNPQ) and the potato cv. Bintje were used.

Results and Discussion

Currently, two companies process arracacha: Nestlé (São Paulo) and Nutrimental S.A. (São Jose dos Pinhais, Paraná). The following list shows Nestlé's average annual processing volumes between 1985 and 1993:

Year	Processed (t)
1985	190
1986	628
1987	216
1988	301
1989	293

1990	245
1991	242
1992	115
1993	400
Mean	292

Obviously, the volume of processed arracacha is still small, when compared with that of other tubers and roots such as potatoes or cassava.

Figure 1 illustrates the process that Nutritional S.A. uses to produce flour, flakes, and diced arracacha, used to give better consistency and colour to instant soups and baby food formulae. Arracacha flour, flakes, and dices are currently being tested for their potential use in meals in government schools. Nutritional S.A. processed 400 t of arracacha in 1991 versus 100 t in June 1994.

Frying experiments yielded arracacha chips of excellent quality and acceptability. Crispness was similar to that of potato chips, but the panel consistently rated appearance of arracacha chips as superior. Panellists emphasized the light sweetness of arracacha chips as an attractive and distinctive feature. Chip yield of arracacha (37%) was higher per raw material wt than that of potato (20%-22%) (ITA 1981). This can be explained by the higher dry matter content of arracacha (as much as 30%), compared with potatoes (around 18%). Additional advantages included lower fat absorption of arracacha chips, the possibility of direct packing, and reduced frying temperatures. Best results were obtained at 140 °C (versus 180 °C for potato chips). Lower frying temperatures would translate into reduced production costs.

Conclusions

In contrast with its decline in the Andes, arracacha is being increasingly used and processed in Brazil, demonstrating a greater agricultural and industrial potential of this "lost crop of the Incas" than had been previously recognized. The high carotene content of arracacha, its distinctly umbelliferous flavour, and special starch properties are the characteristics in which industrial processors are most interested. To date, although arracacha is being added to instant foods, particularly baby food formulae, it is added only in minor proportions because of its high costs as a raw material and its popularity in the fresh market. Arracacha chips have, so

far, been tested only at the product development stage, but appears to be a promising new product with excellent qualities—whether it will succeed on the market remains to be seen. More research is needed to increase arracacha productivity in the field and identify suitable genotypes to help improve the root's marketability.

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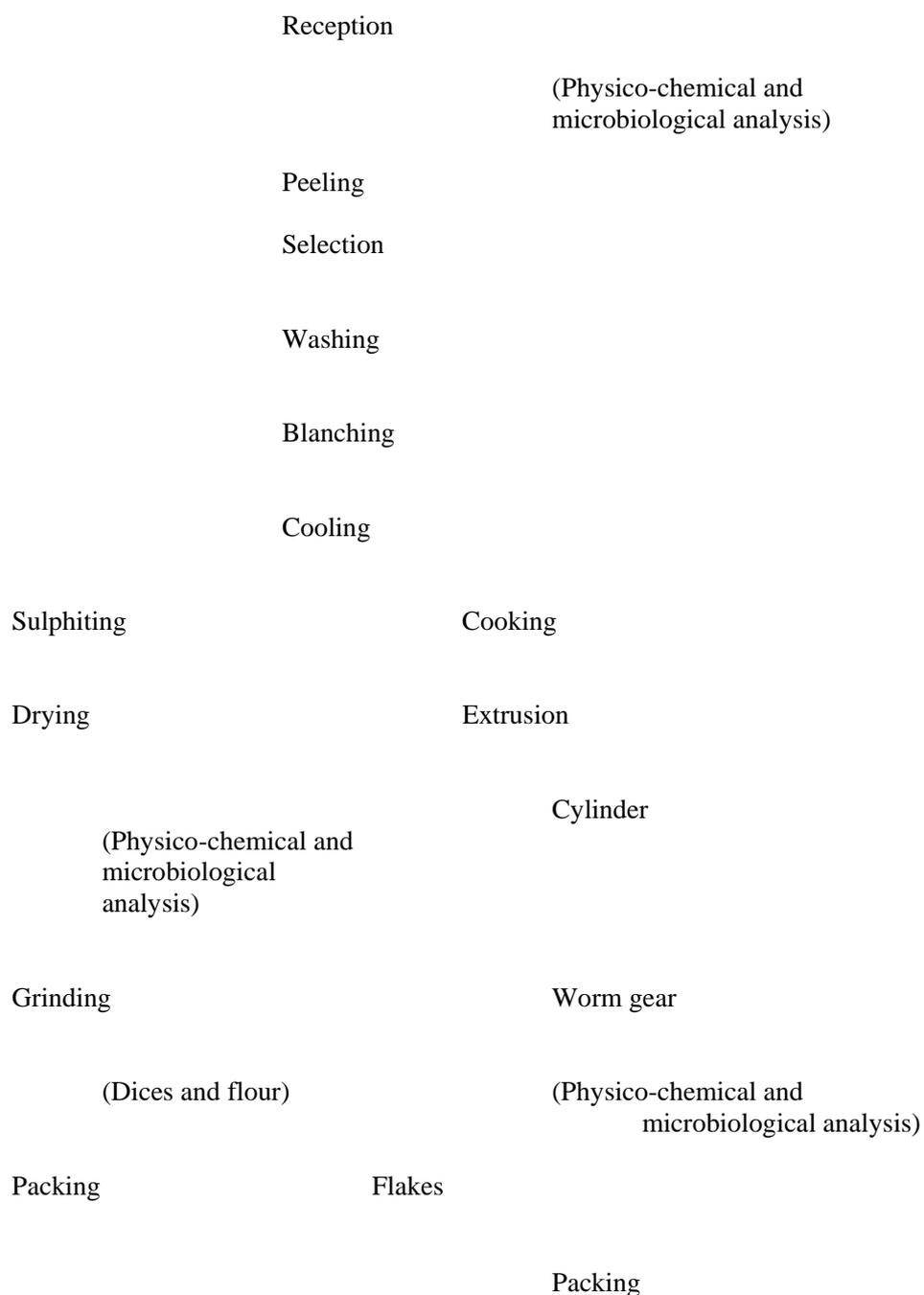


Figure 1. Processing arracacha at Nutrimental S.A., São Jose dos Pinhais, Paraná, Brazil.