



REPORT ON
RATTAN SHOOT PROCESSING TECHNIQUES



by

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PD 24/00 Rev. 1(I) :

Promotion of Sustainable Utilization of Rattan from Plantation in Thailand

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November 2002



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ABSTRACT

There are more than 60 types of young rattan in Thailand, but the only *Calamus sp.* is one of the most favorable food in the Northeast region. The most popular rattan in Sakon Nakhon province is *Calamus sp.* or locally called "Wai Dong". This species have medium stem, diameter about 2-2.5 cm. Due to that qualities, the study about rattan shoots processing in canning is set in order to present their food preservation qualities and also extension approach to the people who are the owner of rattan shoot plantation or interested in rattan shoot production. The study conducted by using glass bottle size 6 oz. in brine of 2 percents and syrup 30 percents concentration adjusting pH below 4.5 by citric acid. The products of rattan shoots in brine and syrup will be storage in room temperature for microorganism examination for 3 and 6 months. There is no microorganism founds in rattan product. The detail is shown in table 1. The nutritive value of rattan products showed little change from fresh rattan shoot in protein and fat. The energy (Kcal) of rattan shoot in syrup is more than rattan shoot in brine and fresh rattan. Because sucrose in syrup give energy. The dehydration product is better in texture and color. The result of sensory evaluation between two treatments, rattan shoot in brine and rattan shoot in syrup are shown in table 3. From the table 3, means of sensory evaluation is between 3.69 to 4.90. So the result is between neutral to like slightly. It means that the products is accepted by panelists.

Key words : *Calamus sp.*, rattan shoots processing, rattan shoots in brine, rattan shoots in syrup.

INTRODUCTION

Rattans are climbing palms that have been utilized for centuries in several Asian countries and their economic importance is second to the forest trees. Rattans are mainly used to make furniture, household utensils and home decorations. However, the use of rattan shoots as vegetable has been mentioned in many areas. According to Renuka C. (2001), young leaves, roots and shoot tips of rattan have been used as medicines and as a vegetable by some indigenous people in Bangladesh. Recently, rattan shoots are popularly consumed and sold in some local areas. Instead of waiting for 6 - 7 years to obtain the cane for utilization, rattan shoots can be harvested just within the second year after planted. Using rattan shoots as an ingredient in many kinds of food is becoming popular especially in the Northern, Northeastern and Central part of Thailand. Moreover, Lao and Vietnam are some of our neighboring countries that consume plenty of rattan shoots and demands for rattan shoots seem to be increased in the near future. It can be foreseen that local market and international market of rattan shoots are tending to be expanded. The most popular rattan species planted for shoots in Thailand are *Calamus siamensis* (Wai Nam Pung) and *C. viminalis* (Wai Dong) that are bitter-tasted. At present, fresh shoots of rattan have become a popular souvenir from the Northeastern while people in the Central started to know how to cook these shoots for food.

Rattans are very useful in pharmaceuticals. Some types of rattans, for example, the ashes of the stem of *Calamus ornatus* Blume are used in treating chronic or returning yaws. An infusion of the root is drunk to lessen pain in child-birth and ethanol (50%) extract of aerial parts is antianemic (Burkill, I.H., 1966). *Calamus acathophyllus* Becc. is prescribed for treating malaria and jaundice; the roots are part of a compound preparation against nausea (Perry, L. M., 1980). In central and south India, it was found that the *Calamus rotang* Linn., the roots are astringent, acrid

bitter, cooling, expectorant, alexeteric, antidysenteric, hypotensive, depurative, antiinflammatory, diuretic, febrifuge and tonic. The leaves are acrid, bitter, cooling, astringent and laxative and are useful in vitiated conditions of pitta, skin diseased, leprosy and pruritus. The seeds are astringent, acrid, sour, depurative and expectorant, and are useful in vitiated conditions of kapha, cough, skin diseases and pruritus. The sprouts are acrid, sweet and thermogeni and are useful in tithed condition of vata and kapra. (Sala, 1994)

OBJECTIVES

To develop techniques for processing, packaging and chemical properties of rattan shoot products.

MATERIALS AND METHODS

Raw material

Calamus sp. (vaidong) shoots

Chemicals

Sodium metabisulphite ($\text{Na}_2\text{S}_2\text{O}_3$), citric acid, calcium chloride (CaCl_2), sodium chloride (NaCl) and sugar.

Equipment

Oven, autoclave, kitchen utensils, gas cooker, glassware, etc.

Test methods

Microorganism examination of rattan shoot in brine and syrup products after 3 and 6 months period analyses by Department of Medical Science, Ministry of public Health (table 1).

The Nutritive value analysis of rattan shoot and rattan products analyses by Nutrition Division, Department of Health, Ministry Public Health, Bangkok (table 2).

Physical properties test after 6 months (table 3).

Methods

1. The processing bottled rattan shoots in brine solution

Rattan shoots (*Calamus viminalis*) (fig. 1) were bought from the farmers. Rattan shoots are peeled the leaf-sheaths and skin by knife (fig. 2). Rattan shoots are opaque white colour. They are cut in pieces long about 3 ¼ inches and diameters are varies from ¼ - ½ inch depend on size of raw material. In this cutting process rattan shoots were in 0.1 % sodium metabisulphite. The prepared rattan shoots were boiled for 10 minutes in blanching solution (fig. 3). The blanching solution contained 0.1% sodium metabisulphite and 0.2% citric acid in water followed by cooling in 0.1 percent sodium metabisulphite solution. Rattan shoots were put in the 6 oz. glass bottles (fig. 4) and the filled with boiling brine solution. The brine solution contained 2% salt, 0.5% citric acid and 0.1% calcium chloride in water. The headspace is about ½ inch in the top of the glass bottle. Samples were exhausting process, the open glass bottles were heated in boiling water bath about 15 minutes and closed the lids (fig. 5). After exhausting, put the glass bottles into boiling water (100 °C) about 30 minutes (fig. 6). The water must boil continuously during the entire processing. The bottled rattan shoot industry, the processing should be done in an autoclave under the steam pressure of 10 pounds per inch (fig. 7), in 15 minutes for 6 oz. bottle, instead of taking 30 minutes in processing under boiling water. Storage in room temperature (fig. 8).

2. The processing bottled rattan shoots in syrup solution

Rattan shoots (*Calamus viminalis*) were bought from the farmers. Rattan shoots are peeled the leaf-sheaths and skin by knife. Rattan shoots are opaque white colour. They are cut in pieces long about 3 ¼ inches and diameters are varies from ¼ - ½ inch depend on size of raw material. In this cutting process rattan shoots were in 0.1 % sodium metabisulphite. The prepared rattan shoots were boiled for 10 minutes in blanching solution. The blanching solution contained 0.1% sodium metabisulphite and 0.2% citric acid in water followed by cooling in 0.1 percent sodium metabisulphite solution. Rattan shoots were put in the 6 oz. glass bottles and the filled with syrup solution contained 30% sucrose, 0.5% citric acid and 0.1% calcium chloride in water. The headspace is about ½ inch in the top of the glass bottle. Samples were exhausting process, the open glass bottles were heated in boiling water bath about 15 minutes and closed the lids. After exhausting, the sterilized process is used by put the glass bottles into boiling water (100 °C) about 30 minutes. The water must boil continuously during the entire processing. Storage in room temperature.

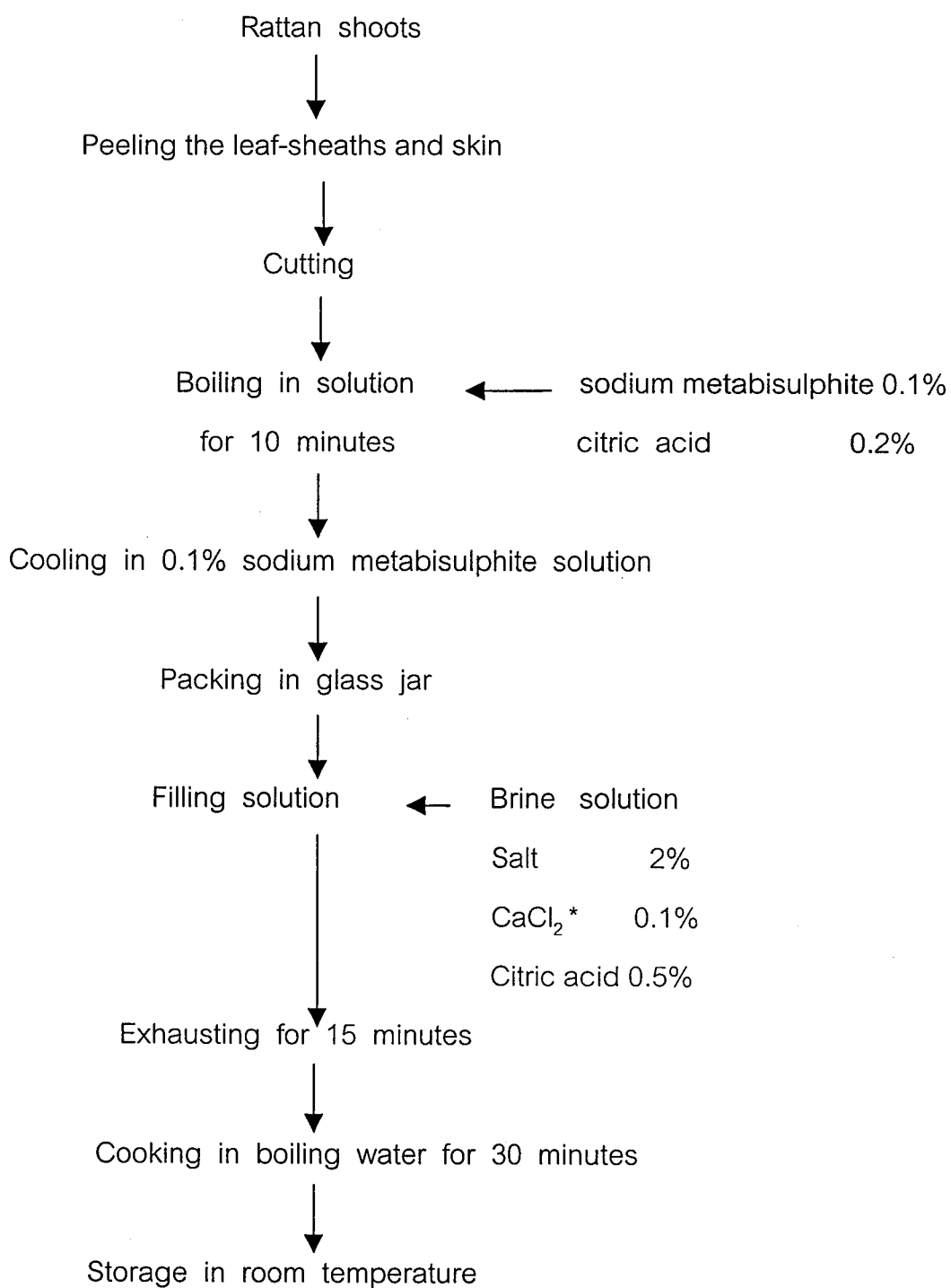
The bottled rattan shoot industry, the processing should be done in an autoclave under the steam pressure of 10 pounds per inch, in 15 minutes for 6 oz. bottle, instead of taking 30 minutes in processing under boiling water.

3. The processing sun-drying and dried rattan shoot.

Rattan shoots (*Calamus viminalis*) were bought from the farmers. Rattan shoots are peeled the leaf-sheaths and skin by knife. Rattan shoots are opaque white colour. They are cut in pieces long about 1 ½ inches and divide to small part depend on size of raw material. In this cutting process rattan shoots were in 0.1 % sodium metabisulphite. The prepared rattan shoots were boiled for 10 minutes in blanching solution. The blanching solution contained 0.1% sodium metabisulphite and 0.2% citric acid in water followed by cooling in 0.1 percent sodium metabisulphite solution. After cooling the shoots are drained and spread on mats or trays and keep in the sun for drying. The sun-drying product will take three to four days to be dried up. However, dehydration of rattan shoots at 70 °C take about 10 hours (fig. 9). And the product is better in texture and color (fig. 10).

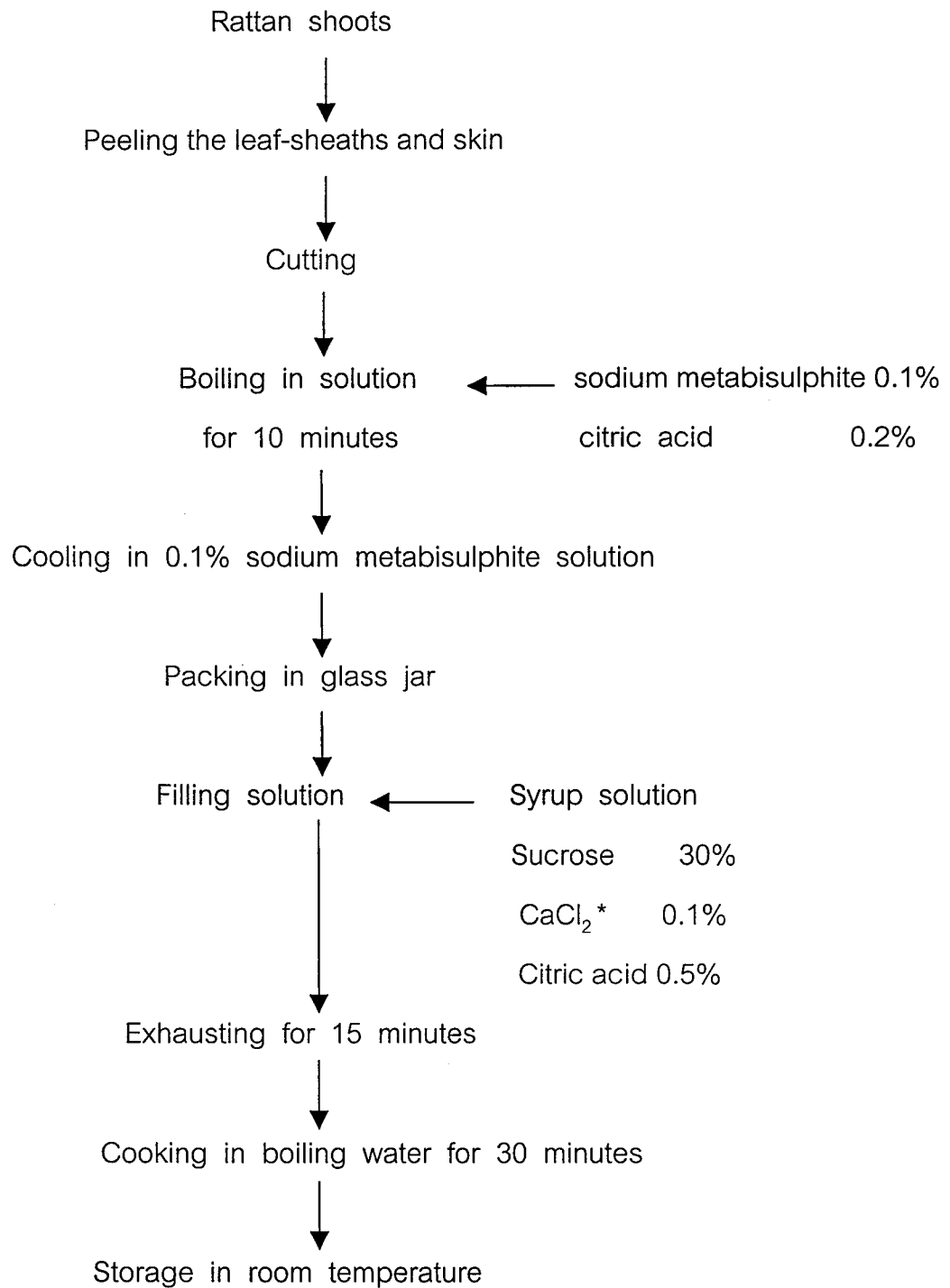
RESULTS AND DISCUSSIONS

Rattan shoot, which is used for glass bottle, sun-drying or dehydration is the soft edible part of the shoot after removing the hard covering part. It is white or cream in color with a little bitter characteristic taste. The taste which is accepted by consumers. According to the result of 3 methods, the processing can illustrate shown in scheme 1, 2 and 3. There is no microorganism founds in bottled rattan shoots in brine and syrup solution after keep it for 3 months and 6 months.



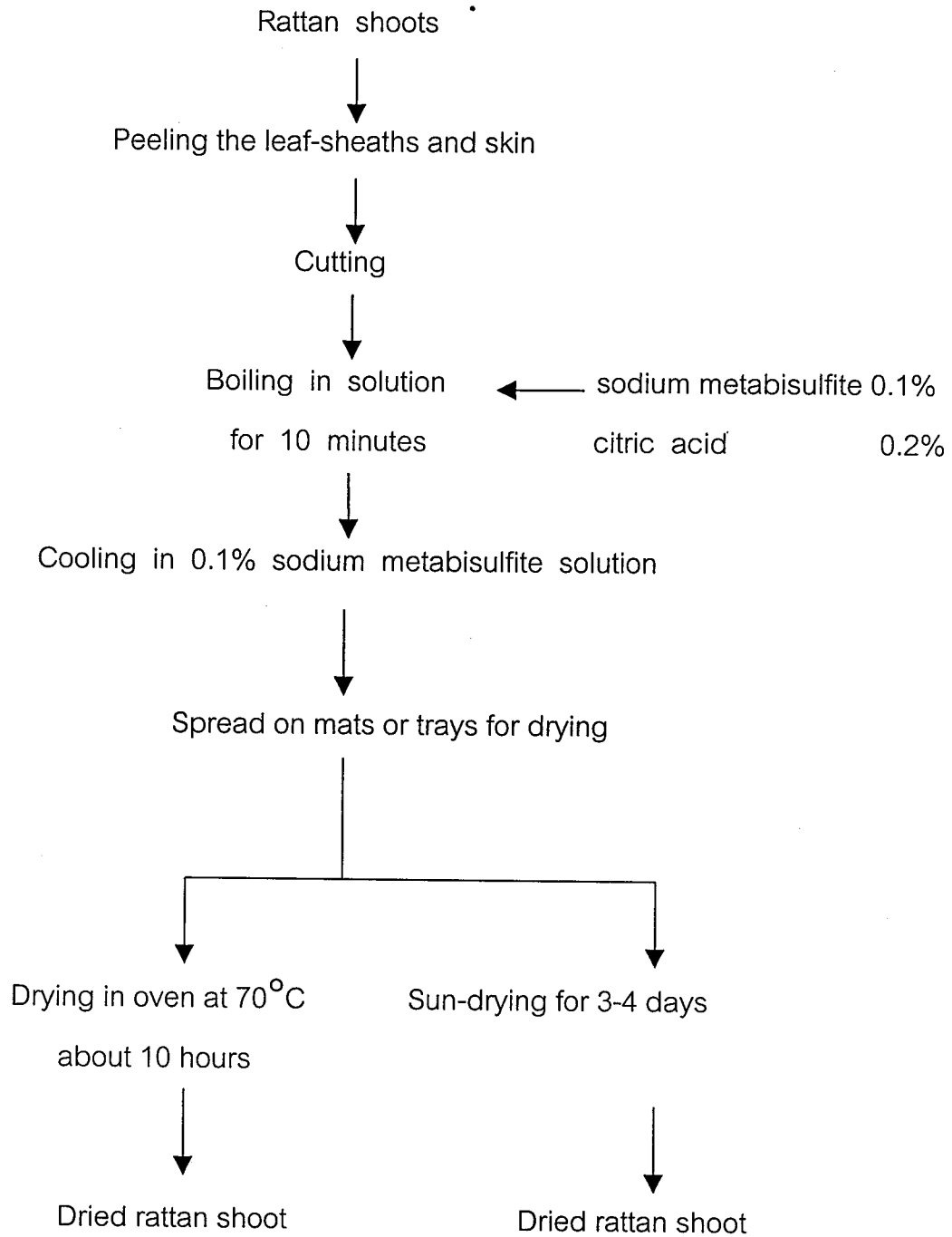
* CaCl₂ = Calcium chloride

Scheme 1 The bottled rattan shoots in brine solution



* CaCl₂ = Calcium chloride

Scheme 2 The bottled rattan shoots in syrup solution



* CaCl_2 = Calcium chloride

Scheme 3 Sun-drying and dried rattan shoot

Table 1 The analysis of microorganism in the rattan shoot products.

Name	pH Value	Bacteria	Yeast and Mould
Rattan shoot in syrup	4.3	Not found	Not found
Rattan shoot in brine	4.3	Not found	Not found

Note: Acid resistance bacteria (at 37 °C and 55 °C)

Department of Medical Science, Ministry of public Health, 2002.

The result of nutritive value of fresh rattan and rattan products are shown in table 2. The nutritive value of rattan products showed little change from fresh rattan shoot in protein and fat.. The energy (Kcal) of rattan shoot in syrup is more than rattan shoot in brine and fresh rattan. Because sucrose in syrup give energy. The results of the study are good in physical appearance which favorated from 50 random testers in moderately marks scale. (table 3)

Sun-drying and dehydration of the soft edible part of the rattan shoot is about ten percents of the whole rattan shoot. The dehydration ratio is 8:1. The rehydration ratio is 1 :3. Moisture content of the product is 6 percents. (U.V. Moisture tester).

Table 2 The Nutritive value analysis of 100 grams edible part.

Sample name	Fresh Rattan shoot	Rattan shoot in brine	Rattan shoot in syrup
Energy (Kcal)	32	28	80
Moisture (g)	92	92	80
Protein (g)	2.51	2.19	3.20
Fat (g)	0.62	0.70	0.66
Fibre (g)	2.53	NA	NA
Vitamin A (RE)	2	3	NA
Vitamin B1 (mg)	0.16	0.04	NA
Vitamin B2 (mg))	0.13	0.07	NA
Vitamin C (mg)	14	4	NA
Vitamin E (mg)	0.45	0.85	NA
Sodium (mg)	10.8	224.0	25.3
Potassium (mg)	361	148	87
Magnesium (mg)	48	33	26
Calcium (mg)	69	40	52
Ion (mg)	0.45	0.42	0.21
Zinc (mg)	2.81	1.61	1.51
Copper (mg)	0.31	0.14	0.20
Iodine (microgram)	2.4	41.5	4.4

Note : NA = Not Analysis

RE = Retinal equivalent (Beta-Carotene)

Nutrition Division, Department of Health, Ministry Public Health, Bangkok, 2002.

Table 3 The sensory evaluation of rattan shoot in brine and rattan shoot in syrup.

Product	means				
	color	odor	flavor	texture	acceptance
rattan shoot in brine	3.80	3.69	3.76	3.80	3.80
rattan shoot in syrup	3.98	3.89	3.82	4.09	3.95

Note :

- 1 = dislike very much
- 2 = dislike slightly
- 3 = neither like nor dislike
- 4 = like slightly
- 5 = like very much

ACKNOWLEDGEMENTS

I wish to thank the International Tropical Timber Organization (ITTO) for providing financial support for this project and thank you the Nutrition Division, Department of Health, Ministry of Public Health, Bangkok for the valuable analysis of nutrition.

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Fig. 1 Edible rattan shoot.



Fig.2 Peel the leaf-sheaths and skin of rattan shoots.



Fig 3. Blanching rattan shoots.



Fig. 4 Packed rattan shoots in the glass bottles.



Fig. 5 Exhausting rattan shoots product.



Fig. 6 Sterilized rattan shoots product in boiling water.

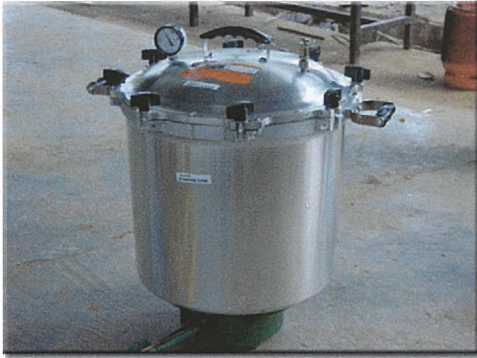


Fig. 7 Sterilized rattan shoots product by autoclave.



Fig. 8 Bottled of rattan shoot.



Fig. 9 Dehydration of rattan shoots by oven.



Fig. 10 Dried rattan shoot products.