

**Table 3. Elemental content of 3 sources of edible sugar**  
(Analyzed by PCA-PTAL, Sept. 11, 2000).  
(Secretaria et al., 2003)

Element/ Nutrient (ppm or mg/L)	Coconut Sugar	Brown Sugar	Refined White Sugar
Nitrogen (N)	2,020	100	0
Phosphorus (P)	790	30	.07
Potassium (K)	10,30	650	25
Calcium -Ca	60	240	60
Magnesium (Mg)	290	70	10
Sodium (Na)	450	20	10
Chloride (Cl)	4,700	180	100
Sulfur (S)	260	130	20
Boron (B)	6.3	0	0
Zinc (Zn)	21.2	2	1.2
Manganese (Mn)	1.3	2	0
Iron (Fe)	21.9	12.6	
Copper (Cu)	2.3	0.6	0.6

**Mineral Primer: Selected minerals needed in relatively large amounts (Cruz et al., 2006).**

- Calcium** - vital for strong bones and teeth, also needed for the heart and nervous system and for muscle growth and contraction
- Magnesium** - essential for enzyme activity, calcium and potassium uptake, nerve transmission, bone formation and metabolism of carbohydrates and minerals
- Potassium** - helpful in treating high blood pressure, excessive use of salt along with inadequate intake of fruits and vegetable results in potassium deficiency
- Phosphorus** - needed for cell and bone growth, kidney function
- Zinc** - called the 'intelligence mineral,' zinc is required for mental development, for healthy reproductive organs (particularly prostate gland)
- Iron** - vital for healthy blood; iron deficiency is associated with poor mental development and problem with the immune system.

High level of active Cl ions - provides electrical neutrality (acid-base body balance) and correct pressure of body fluids; balance electric charges in the human nervous systems for our healthy body and mind ([www.c3.org/chlorine](http://www.c3.org/chlorine))

Source: SMARRDEC write-up, 2006.

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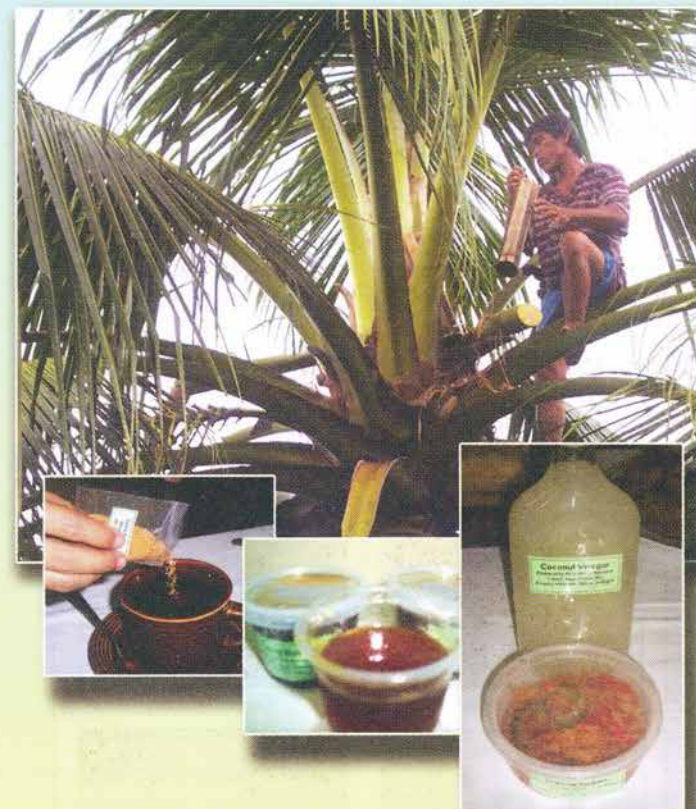
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# Coco Sap Products





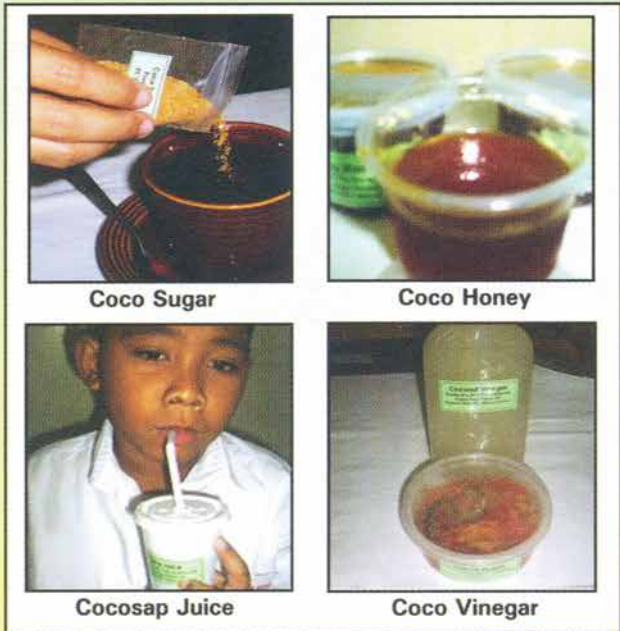
# Introduction

The coconut tree as a 'tree of life' is characteristically a food supplier as this tree provides fruit throughout the year. The fruit is edible at any stage of maturity. It provides not only solid food but also a large volume of very safe and healthy drinking water.

The fruit of the coconut palm is the main source of many food products such as coconut milk/cream, desiccated coconut, coconut chip, coconut water, nata de coco, coconut oil, and copra. Apart from these, the unopened inflorescence can produce coconut sap or toddy which can be processed into high value and nutritious food products.

Coconut sap, the sweet exudate from the tapped unopened spathe or inflorescence of coconut, is a versatile food product because of its many uses. It could be marketed as an alcoholic drink (4–6% alcohol) locally known as 'tuba' or coconut wine; as vinegar (under further natural fermentation) or as 'lambanog' or distilled wine (24–45% alcohol). The sap can also be processed to sap juice/drink, syrup or honey, crude sugar or granulated brown sugar.

# Coco Sap Food Products



Coco Sugar

Coco Honey

Cocosap Juice

Coco Vinegar

# Steps in Processing

## Coconut Sap Juice

- Pasteurize the sap for 10 minutes at 65°C (to prevent natural fermentation).
- Pour separately in the desired container.
- Seal tightly and place in the cool section of the refrigerator or freezer if the juice is to be transported to consumers in distant places.
- If hygienically prepared, the juice can be stored for 3 days.

## Coconut Honey or Syrup

- Boil the sap until it reaches 110°C or becomes sticky under moderate to very slow heat.
- Cool the sticky liquid or coco honey/syrup, then pour into desired container.
- Store in the refrigerator to prolong shelf life (up to one year without deterioration).

## Coconut sugar

- Boil cocosap to evaporate the water under moderate heat with occasional stirring until sap thickens at 115°C.
- Remove from the flame when it begins to become very sticky.
- Continue mixing until it becomes granular.
- Air dry the brown sugar before packing. The pH of coconut sap should be at a level  $\geq 6$  to ensure successful production of granulated coconut sugar.

One kg of coconut sap sugar can be derived from 2 gallons or 7–8 L of sweet fresh cocosap. Coconut sugar is mostly used for cooking desserts and curries and some for raw material of food industries (e.g., confectionery).

## Coconut Vinegar

- Pour harvested sap into a wide and large container. Cover with a clean net to allow aeration and prevent entry of dirt and foreign objects.
- After the 10 days, harvest the coconut sap as vinegar.
- Pasteurize vinegar by heating for 5–10 minutes at 60–65°C to maintain the desired quality (at least 4% acidity) of the vinegar.
- Allow to cool before placing in very clean bottles. Cover tightly and seal. The coco sap vinegar is a very good ingredient in pickled papaya and as a dip for chicharon and other snack and food preparations.

# Composition and Nutritional Value of Cocosap

Table 1. Average chemical composition and nutritional value of coconut sap (Naka, 1996).

Parameter	Value (/100g or ml)
Amino Acid	Value (g/100g)
Tryptophan	1.27
Lysine	0.32
Histidine	1.19
Arginine	0.35
<b>Aspartic Acid</b>	<b>11.22</b>
pH	5.75
Total sugar % (mainly sucrose)	18.09 g
Water	87.5 ml
Calories	48.0 joule
Carbohydrate	11.4 g
Protein	0.22 g
Fat	0.40 g
Calcium (Ca)	0.40 mg
Phosphorus (P)	20.0 mg
Iron (Fe)	0.18 mg
Thiamine	0.016 mg
Riboflavin	0.006g
Niacin	0.48 mg

Table 2. Amino acid content of freshly-gathered coconut sap (Kosaki, 1974 in Magat, 1996).

<b>Threonine</b>	<b>15.36</b>
Serine	8.24
Glutamic Acid*	34.20
Proline	3.52
Glycine	0.47
Alanine	2.56
Valine	2.11
Isoleucine	0.38
Leucine	0.48
Tyrosine	0.31
Phenylalanine	0.78

\* Glutamic acid – amino acid used by the body to build protein. It is the most common stimulating neurotransmitter in the nervous system ([http://www.vitacost.com/science/hn/supply/glutamic\\_acid.htm](http://www.vitacost.com/science/hn/supply/glutamic_acid.htm)), also plays a role in the normal function of the prostate.