

Table 3. Elemental content (ppm or mg/li) of 3 sources of edible sugar (Analyzed by PCA PTAL, Sept.11, 2000) (Secretaria et.al., 2003)

Element/ Nutrient	Coconut Sugar	Brown Cane Sugar	Refined White Sugar
	mg/Kg (ppm)		
Nitrogen -N	2,020	100	0
Phosphorus-P	790	30	0.7
Potassium -K	10,300	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	1.2
Copper -Cu	2.3	0.6	0.6

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

1. *Calcium* – vital for strong bones and teeth, also needed for the heart and nervous system and for muscle growth & contraction
2. *Magnesium* – essential for enzyme activity, calcium and potassium uptake, nerve transmission, bone formation and metabolism of carbohydrates and minerals
3. *Potassium* – helpful in treating high blood pressure, excessive use of salt along with inadequate intake of fruits and vegetable results in potassium deficiency
4. *Phosphorus* – needed for cell and bone growth, kidney function

5. *Zinc* – called the 'intelligence mineral', zinc is required for mental development, for healthy reproductive organs (particularly prostate gland)
6. *Iron* – vital for healthy blood, iron deficiency is associated with poor mental development and problem with the immune system
7. *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 system; and enhances the efficient digest & immune systems for our healthy body and mind (www.c3.org/chlorine)

General Information No. 01/2016



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**Coconut
Sap-Based
Food Products**

TECHNOLOGY DESCRIPTION

- Coconut sap (toddy) is one of the best food products to consider because of its many uses.
- Locally known as "tuba" or coconut wine; as vinegar (under natural fermentation) or as "lambanog" or distilled wine (24-25% alcohol).
- The sap can also be processed to sap juice/drink, syrup or honey, crude sugar or granulated sugar.

Coco sap food products



Coconut Sap Juice Coconut Honey Coconut Sugar Coconut Vinegar

STEPS IN PROCESSING

Coconut Sap Juice

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

Coconut Honey or Syrup

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

Coconut Sugar

1. Boil cocosap to evaporate the water under moderate heat with occasional stirring until sap thickens at 115°C.
2. Remove it from the flame when it begins to become very sticky.
3. Continue mixing until it becomes granular.
4. Air dry the brown sugar before placing them in packaging material. The pH of coconut sap should be at a level ≥ 6 to ensure successful production of granulated coconut sugar.

One kg of coconut sap sugar can be derived from two (2) gallons or 7-8 li 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

1. Pour harvested sap in a wide large container with clean netted cover to allow aeration & prevent entrance of dirt and foreign objects.
2. Harvest the coconut sap as vinegar after 10-day fermentation period in a well ventilated room.
3. Pasteurize vinegar by heating for 5-10 minutes at 60-65°C to maintain the desired quality (at least 4% acidity) of the vinegar.
4. Allow to cool before placing in very clean bottles and then cover tightly and sealed. The coco sap vinegar is a very good ingredient in pickled papaya, as a dip in chicharon and other snack and food preparation.

COMPOSITION & NUTRITIONAL VALUE OF COCOSAP

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

Parameter	Value (/100g or ml)
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	0.016mg
Riboflavin	0.006 mg
Niacin	0.48 mg
Ascorbic Acid	20.6 mg

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

Amino Acid	Value (g/100g)
Tryptophan	1.27
Lysine	0.32
Histidine	1.19
Arginine	0.35
Aspartic Acid	11.22
Threonine	15.36
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's the most common stimulating neurotransmitter in the nervous system (http://www.vitacost.com/science/hn/supply/glutamic_acid.htm), also plays a role in the normal function of the prostate.