

Profitability Analysis:

Coconut Sap Sugar Production Module



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Foreword

This year, the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) offers a new technology publication that promises to be fully utilizable and handy.

The Profitability Analysis (PA) arose from our yearning to address your needs as small and micro entrepreneurs, farmers, and growers. More than just a handout, this innovative package of information provides tools to help you gain and secure a niche in your business enterprise.

The PA series is based on our study of selected commodities. Here you will find the technical and financial data you will need to put up an agricultural enterprise. It presents analytical tools you can use in project planning and in predicting how the business would operate under a set of assumptions. Thus, it ensures that your projects are technically and economically feasible for implementation. Through the profitability analysis and other information, we at PCARRD, hope to contribute substantially in providing livelihood options for Filipinos, especially those in rural communities.

This PA contains the projected income statement and cash flow for coconut sap sugar production module. It also includes package of technology and other useful data adopted from the Philippine Coconut Authority (PCA).

Feel free to make use of the information in these pages. Contact us for any further information you may need or better yet, for any suggestions on how we can make this publication better. Together, we can improve the production system for coconut sap sugar and seal its importance in our national economy.



PATRICIO S. FAYLON

Executive Director
PCARRD

Message

One of our advocacies is to encourage product diversification of coconut to increase income of the coconut farmers who through the years are solely dependent on copra production. The production of sugar, a high-value product from coconut sap/toddy, paved the way for alternative livelihood for the coconut growers particularly in the rural areas of the country.

The coconut sap sugar is an emerging high-value product that captured the functional food market. It is known as a natural sweetener for diabetics due to its low Glycemic Index (GI) at 35, which is far from the 54 GI considered by nutritionists to be good for sugar-starved people. The phenomenal demand for this product has made a significant impact in the marketplace as well as in the livelihood of the coconut farmers in the rural areas. Moreover, the coconut sap sugar already has gained a big push to invade the export market as it is presently becoming popular in the niche market of the U.S.A. and Europe.

However, the current production output cannot supply the growing requirements of the local and the export markets. It is for this reason that the Philippine Coconut Authority is set to expand the coconut sap sugar production nationwide. At present, our research efforts are aimed at improving the production process to lower the cost of production and sustain good quality product in adherence to the standards. Trainings and seminars are also being conducted to persuade our rural coconut farmers to make use of the potentials of the coconut sap sugar production as a sustainable village-level social enterprise.

Our gratitude to PCARRD in coming up with this *Profitability Analysis: Coconut Sap Sugar Production Module* that will guarantee the business prospects and will boost the confidence of interested clientele in venturing to this new coconut-based agribusiness.



OSCAR G. GARIN

Administrator, Philippine Coconut Authority

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Introduction

The nutritious coconut sap sugar is a novel product and an important addition to the numerous products that can be derived from the coconut plant. It is made from coconut sap or toddy, locally known as 'tuba', the oyster-white liquid oozing out from the unopened inflorescence. The sap contains 12–18% sugar in its natural form with important vitamins and amino acids.

The Philippine coconut sap sugar is an emerging high-value product that gained popularity because of its health benefits. It has very low Glycemic Index (GI) at 35, making it an important functional food — a natural sweetener for the diabetic and those who have family history of diabetes.

Initial Capital	₱1.42 M
NPV (based on a 10-year cash flow projection at 15% discount rate)	₱648,676.86
IRR (based on a 10-year cash flow projection)	28%
Payback Period	3.64 years

The inflorescence of coconut trees in good stand can yield an average of 2 L of sap per tree per day. Moreover, an average of 1 kg of sugar can be produced from 4 coconut trees per day. The production and the sugar content of the sap, however, is dependent on the location and variety of the tree, season, nutrition, as well as the tapping time and system.

Transforming the coconut sap to sugar granules is simple and requires basic equipment that is why it is appropriate and best adapted to a farm-level or medium-scale enterprise. It is a good source of immediate income for coconut farmers and at the same time the demand is getting bigger both in the local and international markets.

An initial investment of ₱1.42 M can yield an average annual net profit amounting to ₱203,762.48. Based on the projected 10-year income statement and cash flow, before financing, income is realized on the first year of operation. The initial investment can be fully recovered in 3.64 years. In addition, the estimated internal rate of return (IRR) is 28% while the net present value (NPV) is at ₱648,676.86 at the discount rate of 15%.

Capital investments.

Particulars	Quantity	Unit	Unit Cost (₱)	Total Cost (₱)	Life Span (Years)
Land*	250	m ²	100.00	25,000.00	not applicable
Processing area	215	m ²	2,496.53	536,753.95	20
pH meter	1	pc	2,300.00	2,300.00	5
Collecting vessel (2 L)	167	pc	11.00	1,837.00	2
Container (4 L)	125	pc	18.00	2,250.00	2
Container (32 L)	16	pc	144.00	2,304.00	2
Wok (100 L)	5	pc	8,000.00	40,000.00	10
Wok (20 L)	5	pc	1,200.00	6,000.00	10
Ladle	26	pc	200.00	5,200.00	2
Strainer	9	pc	100.00	900.00	2
Tray	21	pc	100.00	2,100.00	2
Soup stock	9	pc	4,000.00	36,000.00	5
Furnace	4	unit	12,000.00	48,000.00	10
Stainless wok (1L)	16	pc	5,100.00	81,600.00	10
Electric stove	8	unit	3,500.00	28,000.00	5
Spatula	8	pc	150.00	1,200.00	2
Wooden trivet	8	pc	500.00	4,000.00	5
Weighing scale	1	unit	4,500.00	4,500.00	2
Sealer	1	unit	5,000.00	5,000.00	5
Vehicle	1	-	-	100,000.00	10
Total				932,944.95	

* Land value in Aroman, Carmen, North Cotabato.

Working capital and pre-operating expenses for site preparation.

Particulars	Total Cost (₱)
Operating cost (includes 1 st month expenses and items procured every 4 months)	475,304.87
Business permit fees	10,000.00
Total	485,304.87

Capital investment after year one (₱).

Particulars	Year									
	1	2	3	4	5	6	7	8	9	10
pH meter	-	-	-	-	-	2,300	-	-	-	-
Collecting vessel (2 L)	-	-	1,837	-	1,837	-	1,837	-	1,837	-
Container (4 L)	-	-	2,250	-	2,250	-	2,250	-	2,250	-
Container (32 L)	-	-	2,304	-	2,304	-	2,304	-	2,304	-
Ladle	-	-	5,200	-	5,200	-	5,200	-	5,200	-
Strainer	-	-	900	-	900	-	900	-	900	-
Tray	-	-	2,100	-	2,100	-	2,100	-	2,100	-
Soup stock	-	-	-	-	-	36,000	-	-	-	-
Electric stove	-	-	-	-	-	28,000	-	-	-	-
Spatula	-	-	1,200	-	1,200	-	1,200	-	1,200	-
Wooden trivet	-	-	-	-	-	4,000	-	-	-	-
Weighing scale	-	-	4,500	-	4,500	-	4,500	-	4,500	-
Sealer	-	-	-	-	-	5,000	-	-	-	-
Total	-	-	20,291	-	20,291	75,300	20,291	-	20,291	-

Initial investment.

Particulars	Cost (₱)
Capital investment	932,944.95
Working capital and pre-operating cost	485,304.87
Total	1,418,249.82

Annual sales.

Particulars	Annual Sales
Price (₱/kg)	175
Coconut sap sugar (kg)	33,984
Total Sales (₱)	5,947,200

Annual depreciation (Straight line method, zero-salvage value).

Particulars	Total Cost (₱)	Life Span (Year)	Annual Depreciation (₱)
Processing area	536,753.95	20	26,837.70
pH meter	2,300.00	5	460.00
Collecting vessel (2 L)	1,837.00	2	918.50
Container (4 L)	2,250.00	2	1,125.00
Container (32 L)	2,304.00	2	1,152.00
Wok (100 L)	40,000.00	10	4,000.00
Wok (20 L)	6,000.00	10	600.00
Ladle	5,200.00	2	2,600.00
Strainer	900.00	2	450.00
Tray	2,100.00	2	1,050.00
Soup stock	36,000.00	5	7,200.00
Furnace	48,000.00	10	4,800.00
Stainless wok (1 L)	81,600.00	10	8,160.00
Electric stove	28,000.00	5	5,600.00
Spatula	1,200.00	2	600.00
Wooden trivet	4,000.00	5	800.00
Weighing scale	4,500.00	2	2,250.00
Sealer	5,000.00	5	1,000.00
Vehicle	100,000.00	10	10,000.00
Total			79,603.20

Operating cost.

Particulars	Quantity	Monthly		Yearly (P)
		Unit Cost (P)	Total Cost (P)	
Coconut sap	24,000 L	7.50	180,000.00	2,160,000.00
Repair and maintenance			3,887.27	46,647.25
Production tools			-	-
Firewood	2,832 kg	10.00	28,320.00	339,840.00
Packaging materials	2,832 pcs	0.80	2,265.60	27,187.20
Box for delivery	48 pcs	15.00	720.00	8,640.00
Packaging tape	16 rolls	85.00	1,360.00	16,320.00
Handwashing and dishwashing soap (1 L)	4 bottles	125.00	500.00	6,000.00
Scrubs	20 pcs	30.00	600.00	7,200.00
Plastic gloves (25 pairs per box)	3 boxes	160.00	480.00	1,440.00
Aprons (50 pcs every 4 months)		100.00		15,000.00
Head caps (50 pcs every 4 months)		20.00		3,000.00
Working gloves (50 pairs every 4 months)		20.00		3,000.00
Potholders (16 pairs every 4 months)		125.00		6,000.00
Face masks	1,200 pcs	5.00	6,000.00	72,000.00

Operating cost (continued).

Particulars	Quantity	Monthly		Yearly (₱)
		Unit Cost (₱)	Total Cost (₱)	
Utilities, water, and electricity			14,160.00	169,920.00
Transportation*			11,328.00	135,936.00
Promotion expenses			33,984.00	407,808.00
Freight cost			19,500.00	234,000.00
Labor				
Administrative staff				
a. Manager	24 manday	300.00	7,200.00	86,400.00
b. Bookkeeper	24 manday	250.00	6,000.00	72,000.00
Production staff (cooking, weighing, sealing, packaging, handling, cleaning, and washing of materials used)	600 manday	250.00	150,000.00	1,800,000.00
Total			466,304.87	5,618,338.45

*Transportation cost includes gasoline expenses for sap collection and coconut sap sugar delivery (from processing plant to cargo center).

Projected income statement (P).

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Projected income					
Sales from coconut sap sugar	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
Gross sales	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
Less: Production Cost					
Coconut sap	2,160,000.00	2,160,000.00	2,160,000.00	2,160,000.00	2,160,000.00
Labor	1,958,400.00	1,958,400.00	1,958,400.00	1,958,400.00	1,958,400.00
Production tools	505,627.20	505,627.20	505,627.20	505,627.20	505,627.20
Promotion expenses	407,808.00	407,808.00	407,808.00	407,808.00	407,808.00
Freight cost	234,000.00	234,000.00	234,000.00	234,000.00	234,000.00
Total production cost	5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20
Gross margin	681,364.80	681,364.80	681,364.80	681,364.80	681,364.80
Less: Overhead Cost					
Utilities, water, and electricity	169,920.00	169,920.00	169,920.00	169,920.00	169,920.00
Transportation	135,936.00	135,936.00	135,936.00	135,936.00	135,936.00
Repair and maintenance	46,647.25	46,647.25	46,647.25	46,647.25	46,647.25
Depreciation cost	79,603.20	79,603.20	79,603.20	79,603.20	79,603.20
Total overhead expenses	432,106.45	432,106.45	432,106.45	432,106.45	432,106.45
Net profit (before interest)	249,258.36	249,258.36	249,258.36	249,258.36	249,258.36
Less: Interest expense on loan amortization	106,368.74	106,368.74	90,592.60	72,450.04	51,586.10
Net Profit	142,889.62	142,889.62	158,665.76	176,808.31	197,672.26

Year 6	Year 7	Year 8	Year 9	Year 10
5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
2,160,000.00	2,160,000.00	2,160,000.00	2,160,000.00	2,160,000.00
1,958,400.00	1,958,400.00	1,958,400.00	1,958,400.00	1,958,400.00
505,627.20	505,627.20	505,627.20	505,627.20	505,627.20
407,808.00	407,808.00	407,808.00	407,808.00	407,808.00
234,000.00	234,000.00	234,000.00	234,000.00	234,000.00
5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20
681,364.80	681,364.80	681,364.80	681,364.80	681,364.80
169,920.00	169,920.00	169,920.00	169,920.00	169,920.00
135,936.00	135,936.00	135,936.00	135,936.00	135,936.00
46,647.25	46,647.25	46,647.25	46,647.25	46,647.25
79,603.20	79,603.20	79,603.20	79,603.20	79,603.20
432,106.45	432,106.45	432,106.45	432,106.45	432,106.45
249,258.36	249,258.36	249,258.36	249,258.36	249,258.36
27,592.56	-	-	-	-
221,665.79	249,258.36	249,258.36	249,258.36	249,258.36

Projected cash flow statement (₱).

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4
Inflows					
Sales from coconut sap sugar		5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
Residual value of infrastructure and land		-	-	-	-
Total inflows		5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
Outflows					
Investment costs					
Processing plant	536,753.95				
Land	25,000.00				
Working capital and pre-operating expenses	485,304.87				
Tools, equipment, and vehicle					
pH meter	2,300.00	-	-	-	-
Collecting vessel (2 L)	1,837.00	-	-	1,837.00	-
Container (4 L)	2,250.00	-	-	2,250.00	-
Container (32 L)	2,304.00	-	-	2,304.00	-
Wok (100 L)	40,000.00				
Wok (20 L)	6,000.00				
Ladle	5,200.00	-	-	5,200.00	-
Strainer	900.00	-	-	900.00	-
Tray	2,100.00	-	-	2,100.00	-
Soup stock	36,000.00	-	-	-	-
Furnace	48,000.00				
Stainless wok (1 L)	81,600.00				

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00
-	-	-	-	-	293,376.98
5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	5,947,200.00	6,240,576.98

-	2,300.00	-	-	-	-
1,837.00	-	1,837.00	-	1,837.00	-
2,250.00	-	2,250.00	-	2,250.00	-
2,304.00	-	2,304.00	-	2,304.00	-
5,200.00	-	5,200.00	-	5,200.00	-
900.00	-	900.00	-	900.00	-
2,100.00	-	2,100.00	-	2,100.00	-
-	36,000.00	-	-	-	-

Projected cash flow statement (continued).

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4
Electric stove	28,000.00	-	-	-	-
Spatula	1,200.00	-	-	1,200.00	-
Trivet	4,000.00	-	-	-	-
Weighing scale	4,500.00	-	-	4,500.00	-
Sealer	5,000.00	-	-	-	-
Vehicle	100,000.00				
Total production cost		4,819,905.60	5,265,835.20	5,265,835.20	5,265,835.20
Total overhead expenses (less depreciation)		323,127.98	352,503.25	352,503.25	352,503.25
Total cash outflows	1,418,249.82	5,143,033.58	5,618,338.45	5,638,629.45	5,618,338.45
Net cashflow (before financing)	(1,418,249.82)	804,166.42	328,861.55	308,570.55	328,861.55
Financing					
Loan Receipt	709,124.91				
Loan repayment		-	211,542.99	211,542.99	211,542.99
Principal payment		-	105,174.25	120,950.39	139,092.95
Payment on interest		106,368.74	106,368.74	90,592.60	72,450.04
Balance		709,124.91	603,950.66	483,000.27	343,907.32
Net financing	709,124.91	-	(211,542.99)	(211,542.99)	(211,542.99)
Net cashflow (after financing)	(709,124.91)	804,166.42	117,318.56	97,027.56	117,318.56
Beginning balance	-	-	804,166.42	921,484.99	1,018,512.55
Ending Balance	-	804,166.42	921,484.99	1,018,512.55	1,135,831.11

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
-	28,000.00	-	-	-	-
1,200.00	-	1,200.00	-	1,200.00	-
-	4,000.00	-	-	-	-
4,500.00	-	4,500.00	-	4,500.00	-
-	5,000.00	-	-	-	-
5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20	5,265,835.20
352,503.25	352,503.25	352,503.25	352,503.25	352,503.25	352,503.25
5,638,629.45	5,693,638.45	5,638,629.45	5,618,338.45	5,638,629.45	5,618,338.45
308,570.55	253,561.55	308,570.55	328,861.55	308,570.55	622,238.53
211,542.99	211,542.99	-	-	-	-
159,956.89	183,950.43	-	-	-	-
51,586.10	27,592.56	-	-	-	-
183,950.43	(0.00)	-	-	-	-
(211,542.99)	(211,542.99)	-	-	-	-
97,027.56	42,018.56	308,570.55	328,861.55	308,570.55	622,238.53
1,135,831.11	1,232,858.68	1,274,877.24	1,583,447.79	1,912,309.34	2,220,879.90
1,232,858.68	1,274,877.24	1,583,447.79	1,912,309.34	2,220,879.90	2,843,118.42

Measures of project worth.

	Before Financing	After Financing
NPV (net benefit)	₱648,676.86	₱741,171.41
IRR	28%	50%
Payback Years	3.64	4.99

Sensitivity analysis.

	Decrease in the Price of Coconut Sap Sugar (₱175– ₱173)		Increase in the Price of Coconut Sap (₱7.5–₱8.0)	
	Before financing	After financing	Before financing	After financing
NPV (net benefit)	₱307,561.19	₱400,055.74	₱221,316.12	₱313,810.67
IRR	22%	34%	20%	30%
Payback Years	4.40	6.56	4.66	7.14

Technical Assumptions

- 1000 L of coconut sap is utilized to produce 118 kg coconut sap sugar.
Conversion: 8.5 L of coconut sap (Malayan Yellow Dwarf variety located in Aroman, Carmen, North Cotabato) is to 1 kg of coconut sap sugar
- 118 kg of coconut sap sugar is produced daily, produced in 2 batches.
- Two sets per batches of employees per day, a total of 50 workers (25 for morning and 25 afternoon operation).
- 24 working days per month.
- There will be a monthly shipment of coconut sap sugar from Aroman, Carmen, North Cotabato to General Santos Port.

Coconut sap sugar production system, half day operation*.

Process	Inputs, Materials, and Equipment		Output	Number of Workers	Duration (hrs)
	Fixed	Variable			
Buying of coconut sap	1 pc pH meter		500 L coconut sap	not applicable	not applicable
	167 pcs collecting vessel (2 L)				
	125 pcs container (4 L)				
	16 pcs container (32 L)				
Boiling	5 pcs wok (100 L)	500 L coconut sap	59 L syrup	5	4
	5 pcs wok (20 L)				
	10 pcs laddle				
	5 pcs strainer				
	5 pcs tray				
	5 pcs soup stock				
	4 units furnace				
Caramelization	16 pcs stainless wok (1 L)	59 L syrup	59 kg coconut sap sugar	8	0.5
	8 pcs laddle				
Cooling	8 pcs spatula	59 kg coconut sap sugar	59 kg coconut sap sugar	8	
	8 pcs wooden trivet				
	8 pcs laddle				
	same 16 pcs stainless Wok (1 L) used in caramelization				

Coconut sap sugar production system... (continued).

Process	Inputs, Materials, and Equipment		Output	Number of Workers	Duration (hrs)
	Fixed	Variable			
Sieving/Drying	4 pcs strainer	59 kg coconut sap sugar	59 kg coconut sap sugar	4	1
	4 pcs tray				
	4pcs soup stock				
Packaging	1 unit weighing machine	59 kg coconut sap sugar	59 kg coconut sap sugar	3 workers from boiling	2 nd day
	1 unit sealer				
Total			59 kg coconut sap sugar	25 workers	

* Except for packaging, which is done on the second day.

Financial Assumptions

1. Working capital includes the 1st month of the 1st year operational expenses and the costs of the following items:
 - a. aprons
 - b. working gloves
 - c. head caps
 - d. pot holders

These items are purchased every 4 months, thus included in the working capital.
2. There are two batches of employees, thus the kitchen garments (apron, working gloves, and head caps) procured are good for 50 persons.
3. Workers are required to wear gloves, apron, hair nets, and other protective clothing to ensure the quality and safety of products for consumption.
4. To avoid double counting in the projected income statement and cashflow, working capital was deducted from the year one operation expenses.

5. The business type of this endeavor is cooperative, thus no tax is imposed.
6. Selling price of coconut sap sugar is ₱175/kg.
7. The coconut sap sugar is for sale on a per order basis. Thus, it was assumed that the daily produce of 118 kg are sold.
8. Freight cost covered the distance from Aroman, Carmen, North Cotabato to General Santos Port.
9. Details of loan
 - Amount loaned - 50% of the total initial investment
 - Owner's equity - 50% of the total initial investment
 - Interest rate - 15%
 - Grace period - one year grace period on principal payment

Coconut sap sugar production:

A farm-level technology producing a high-value product from the sap of the coconut inflorescence.

It is a simple farm-level technology involving a natural process of heat evaporation to convert liquid sap to solid form of sugar granules. No need for complicated and high-cost machineries or equipment. It also requires less capital.

Step 1: Selection of tree and mature inflorescence for tapping

- Select bearing trees with healthy unopened inflorescence for tapping.
- Bend the mature unopened inflorescence downwards for 1 week to allow the flow of the sap after tapping.
- Tie the inflorescence with plastic twine and slowly pull them downwards.
- Using a sharp knife, tap the inflorescence by slicing at least 6 mm to cut the tissues and eventually allow the surge of the sap. When the tip of the unopened coconut inflorescence is cut out, the sap slowly flows out.

Step 2: Collection of coconut sap

- After slicing the unopened inflorescence, collect the liquid sap oozing out with the use of a plastic vessel. The collected sugar-liquid has about 12–18% sugar content. Coconut sap is known to contain important amino acids, minerals, and vitamins.
- To avoid the fermentation of the fresh sap, start its collection 5 hours after tapping. A total of 850 L of sap ready for processing can produce 1,000 kg of sugar.



Collection of coconut sap.

Step 3: Heat evaporation

- Boil the collected sap up to 115°C using a brick-fabricated oven locally known as 'pugon'. The oven has improvised chimney where smoke will be emitted to ensure smoke-free smelling sugar.
- When the liquid is already boiling the scum will come out and this has to be removed to avoid the formation of dark residues on the final product.
- The boiling of the sap will take about 3–4 hours to remove water, leaving the sugar content of the coconut sap.



Step 4: Conversion of sap syrup to coconut sap sugar

- Transfer the liquid to food grade stainless wok when it turns into syrup.
- Stir the syrup continuously to avoid burning and to ensure granulation. At this phase, the liquid will change into solid form, hence, temperature change is critical. Stirring allows air to enter the sticky syrup that will cause the gradual cooling resulting to granulation.
- Remove wok from the fire and transfer it to a wooden trivet. Stir until the sugar granules are formed.



Conversion of coconut sap syrup to coconut sap sugar granules.

Step 5: Sieving and drying the coconut sap sugar

- Let the sugar cool off and continue pressing to break the lump.
- Sieve the sugar to have a uniform particle size to produce quality product.
- Put the sugar granules in a food grade stainless tray and let dry for 1 hour to lessen the moisture content.



Sieving of coconut sap sugar granules.

Step 6: Weighing and packaging

- Collect the sugar in a big container and store overnight.
- Weigh and pack the sugar using the commercially available transparent polyethylene plastic bags (.03 in x 8 in x 5 in).



Weighing and packaging of coconut sap sugar.

Comparative nutritional values of the coconut sap sugar vs. brown sugar.

Element (ppm or mg/L)	Coconut Sap Sugar	Brown Sugar
Nitrogen	2,020	100
Phosphorus	790	35
Potassium	10,300	650
Magnesium	290	none
Chloride	4,700	180
Sodium	450	none
Sulfur	260	none
Copper	2.3	none
Manganese	1.3	none
Boron	6.3	none
Zinc	21.3	2.0
Iron	21.9	12.6

Product Description

C – coconut-based product

O – offers health benefits

C – clinically tested

O – organic in nature

S – sweetener for diabetics

A – all natural product

P – preservative-free

S – source of nutrients

U – unique invert sugar

G – glycemic index is low

A – all in one sugar

R – regulates blood sugar

Product Quality Standards

Every product should have a standard system of grading and classifying based on its quality for the purpose of commercialization.

The Philippine National Standard (PNS) for coconut sap sugar obtained from the fresh sap tapped from the unopened inflorescence of coconut tree is being finalized by the Bureau of Agricultural Foods and Products Standards in collaboration with PCA. The following properties are now in place but may be changed upon the approval of PNS for coconut sap sugar:

Physical Properties

- Color: light yellow to dark brown
- Odor : free from burnt odor
- Taste: free from burnt taste

Chemical Properties

- Moisture Content (%) : ≤ 4.0
- Glucose Content : 2.8–3.0
- Fructose Content : 1.0– 4.0
- Sucrose : 78.0–89.0
- Ash : ≤ 2.4

Microbiological Properties

- Salmonella : Negative
- *E. coli* : Negative
- Coliform Count : $< 10\text{cfu/g}$
- Total Plate Count : $< 10\text{cfu/g}$
- Mold and Yeast : $< 10\text{cfu/g}$

Coconut sap sugar classification.

Classification	Specification	Tolerance
Premium (superior quality)	Cream to light yellow Moisture content is < 4%	5.0%
Class I (good quality)	Light brown to brown Moisture content is not >4%	10.0%
Class II	Includes the coconut sap sugar that did not qualify as Class I and Premium but satisfied the minimum requirements of the product standards	10.0%

Market Prospects

Coconut sap sugar exported to United States, Japan, and Middle East are produced mainly in Mindanao. Other regions like Region IV- A, Region VI, Region VIII, and Region X also produce coconut sap sugar. The PCA-Seed Garden in Aroman, Carmen, North Cotobato and the Zamboanga Research Center (PCA-ZRC), are the two major producers of coconut sap sugar closely managed by PCA.

However, these production areas cannot provide sufficient supply to their existing buyers due to limited production volume ranging from 200 kg to 800 kg per week. Interested buyers from various institutions particularly the business sector, e.g., hotels and department stores, engaged in selling coconut sap sugar have to place their order in advance.

Interest in the product is growing notably from health enthusiasts and diabetics worldwide. In 2003, the International Diabetes Federation estimated about 194 million people

worldwide that are believed to have diabetes. Experts project that by 2030, this figure will be more than double. An estimated 50% of the world population have diabetes but are not aware that they have it, and 85% of these have Type 2 Diabetes, which is acquired largely due to bad eating habit and lack of physical activities. Type 2 Diabetes develops if the body does not respond properly to insulin, which makes it difficult for the cells to get sugar from the blood to make energy or if the pancreas does not make enough insulin (WebMD, 2009).

Based on the Asia-Pacific data, the Philippines ranked 4th with the highest incidence of diabetes in Asia in 2005 (Philippine Information Agency, 2008). About 6 million Filipinos are aware that they have diabetes; the same number are unaware that they are diabetic. Health experts also believe that there are many who have impaired glucose tolerance (IGT) and are prone to diabetes (Philippine Chamber of Commerce and Industry, 2008).

In anticipation of the increase in demand following the latest PCA findings on the suitability of coconut sap sugar as a cheaper, natural alternative to more expensive synthetic sweeteners, producers are now packaging the coconut sap sugar in easy-to-use sachets (BAR, 2007). Coconut sap sugar has great potential as a natural and cheaper alternative for synthetic sweeteners now in the market. The market for alternative sweeteners like coconut sap sugar has reached US\$1.1 billion and is projected to increase its share of sweetener consumption.

Coconut sap sugar is already available in Indonesia and Thailand but they are used primarily as confectionery sugar for making sweets and desserts. While the United States remains the country's main market, trial marketing had already started in Japan, Middle East, and China.

The Southeast Asian Ministers of Education Organization-Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEAMEO-SEARCA) Biotechnology Information Center also reported that there are already private sectors interested in marketing Philippine coconut sap sugar locally and abroad.

Production and Marketing Scheme

The production and marketing of coconut sap sugar can be undertaken by formal groups like cooperatives that can shorten the market channels through direct marketing with buyers such as exporters, wholesalers, retailers, or end-users. Direct selling of the product lessens the market channels or intermediaries, hence a higher profit can be generated.

Coconut sap sugar may be packaged in desired container, size, and grade. Packaging may be adopted in 1 kg, ½ kg, ¼ kg, and individual sachet of 5 g appropriate for travelers and restaurant clients. In addition, proper grading of the product, (classifying the produced into premium, class I, and class II) is being considered by the PNS as drafted by the Bureau of Agricultural Foods and Products Standards. From this, producers can set higher prices for premium grades. Based on this, inclusion of the nutrient content and health benefits from the coconut sap sugar in the product label can be done. Since the product is positioned as a premium good, fabricating a container that suits its identity is therefore recommended.

Coconut sap sugar is less expensive compared to chemically processed sweeteners presently used by diabetics (₱100–₱150 per 50 g). Aside from the lower price, the coconut sap sugar is all natural and contains natural nutrients good for human health. Since people are becoming more health conscious as more organic/natural products are being introduced in the market, producers can take advantage of the coconut sap sugar's low GI and natural attributes.

A regulatory board is also being considered by PCA to monitor the quality coconut sap sugar products, issue coconut sap sugar handler licenses, and regulate prices, and other incentives. This will benefit both the consumers and interested investors.

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