

NURTURING HEALTH & WELLNESS
with
COCONUT WATER SOLIDS



presented by



SABINSA CORPORATION

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INTRODUCTION

Coconut water, the liquid endosperm of green coconuts (*Cocos nucifera*), is a refreshing beverage, a natural rehydration medium, and is used as a supplement in nutrient media for tissue culture. Because it offers higher amounts of electrolytes such as potassium and magnesium than regular sports drinks, coconut water is known as a “natural isotonic sports drink.” Functioning as a prebiotic, coconut water solids support beneficial bacteria in the gut. The endosperm abounds in essential nutrients such as proteins, amino acids, sugars, vitamins, minerals and growth factors, that nourish the growth of the embryo in green coconuts, and therefore potentially support healthy cell growth and metabolism in other living tissues as well.

It's important to differentiate between coconut milk and coconut water. The first is a sweet, milky white cooking base taken from the flesh of a fully developed coconut, while the latter is the liquid endosperm of the coconut. The liquid endosperm is sometimes incorrectly called coconut milk, however this terminology comes from the French term *lait de coco*. *The correct term is coconut water, not coconut milk.*

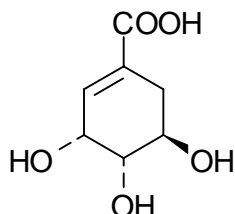
COCONUT WATER COMPOSITION

The coconut is unique in that it contains large amounts of liquid endosperm for a year or more of its life. The largest quantity of the liquid endosperm, coconut water is however contained in young green coconuts, and it delivers vital nutrients for sustained development of the solid endosperm (coconut meat) found inside the fruit.

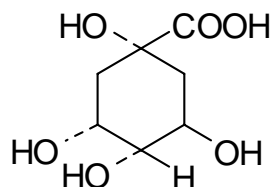


At the completion of growth, the solid endosperm and the last of the coconut water provide nourishment for the forming embryo and seedling. Thus, coconut water serves the role as a reservoir of nutrients to support tissue growth (Tulecke, et. al; 1961).

Shikimic Acid



Quinic Acid



The liquid is rich in proteins, amino acids, sugars, vitamins, minerals and growth factors (Table 1) with pivotal roles in supporting tissue growth. Shikimic acids and quinic acids have been found in extracts of coconut water obtained from fruits at various stages of development, with the greatest amounts being found in young, green coconuts. These alicyclic acids participate in aromatic biosynthesis, and are therefore significant in the growth and development of the budding coconut. These compounds along with identified cytokinins also play an important role in the nourishment and growth of plant and animal cells.

Table 1.
Vitamins, Growth Promoters, Sugar
alcohols, and minerals in coconut water
(Tulecke, et al.; 1961)

COMPOUND	M g/L
Nicotinic acid	0.64
Pantothenic acid	0.52
Biotin	0.02
Riboflavin	0.01
Folic acid	0.003
Thiamine	Trace
Pyridoxine	Trace
Auxin	0.07
Gibberellin	*
1,3-Diphenylurea	5.8
Sorbitol	15.0
M -inositol	0.01
Scyllo-inositol	0.05
	M g/100g
Potassium	312.0
Chloride	183.0
Sodium	105.0
Phosphorus	37.0
Magnesium	30.0
Sulfur	24.0
Iron	0.10
Copper	0.04



The amount of RNA-phosphorus (RNA-P) in coconut water was discovered to be consistently high in green coconut water (Table 2, Tulecke, et al.; 1961). The role of RNA in amino acid transport and respiratory metabolism of living cells is well known. The RNA of coconut water would therefore efficiently support the metabolic mechanism vital to the budding endosperm tissue of the coconut, and sustain the growth of other living cells as well, in tissue culture.

Table 2: RNA-P to DNA-P ratio

**RNA-PHOSPHORUS AND DNA-PHOSPHORUS OF THE
ALCOHOL-INSOLUBLE RESIDUE FROM COCONUT WATER**

Age of coconuts	$\mu\text{G}/\text{mg}$ alcohol-insoluble residue		Ratio
	RNA-P	DNA-P	RNA-P/DNA-P
Young green	20.05	0.06	342.5
Mature, green	32.82	2.45	13.9

Coconut water has been used in the tropics as a nutritive and rehydrating agent to restore electrolyte balance in cases of diarrhea (Adams, et al.; 1992). A published research report mentions that coconut water can be used as a short term intravenous (IV) fluid (Campbell-Falck, et al.; 2000). Other reported applications include use in total parenteral nutrition (TPN) (Petroianu, et al.; 2004), and sports beverages (FAO, 1998).

Coconut water is described as an isotonic sports beverage. A comparison of coconut water with regular sports beverages is presented in Table 3 (FAO, 1998).

Table 3. SPORTS DRINKS VS. COCONUT WATER

Component	Sports drinks (mg/100 ml)	Coconut water (mg/100 ml)
Potassium	11.7	294
Sodium	41	25
Chloride	39	118
Magnesium	7	10
Sugars	6	5

Since coconut water solids can support cell growth, coconut water may be used in products to support the growth of human tissues such as hair follicles. Coconut water can therefore be used in revitalizing preparations for the care of skin, hair and nails.



FORMULATING COSMETICS AND NUTRICOSMETICS CONTAINING COCONUT WATER SOLIDS:

A proprietary lyophilization process produces a stable composition of coconut water with its inherent biological activity preserved (European Patent No. 1341547). The process is designed to produce an amorphous solid, which is easy to work into food and personal care formulations. Protein components and environment sensitive actives are protected by the amorphous nature of the solid, during subsequent processing. During storage, the material changes to the more stable, less hygroscopic, crystalline state.

In preparing the proprietary lyophilized composition Cococin™, green coconuts are harvested at the right stage of maturity to guarantee optimal content of RNA and growth factors, including shikimic acid, quinic acid and indole-3-acetic acid, essential vitamins, amino acids, and minerals.

The proprietary freeze dried coconut water solids blend seamlessly with dry products, and readily dissolve in water. Cococin™ is thus The Nourishment Factor™ that provides a valuable nutrient pool for enhancing food and beverage, as well as cosmetic product formulations.

CLINICAL STUDY SHOWING THE EFFICACY IN REDUCING THE APPEARANCE OF SKIN AGING:

22 females in good health of ages 20-35 years old were subjects in a double blind placebo controlled clinical study (Research Report Sami Labs Ltd., 2005). A cream containing 1% coconut water solids (Cococin™ INCI: Cocos nucifera (coconut) fruit juice, with other natural ingredients) was applied onto the left arm of each subject, and the cream base was applied onto the corresponding area of the right arm, to serve as control. 200 mg of the cream and cream base was applied daily for eight weeks, to the marked areas on the left arm and right arm respectively.

Percent reductions in skin roughness and modifications in skin elasticity were used to evaluate the product. Skin roughness was evaluated using a skin visiometer and dermal elasticity was measured using a cutometer. The percent decrease in skin roughness and change in elasticity effected by the cream and cream base were compared (Figure 1).



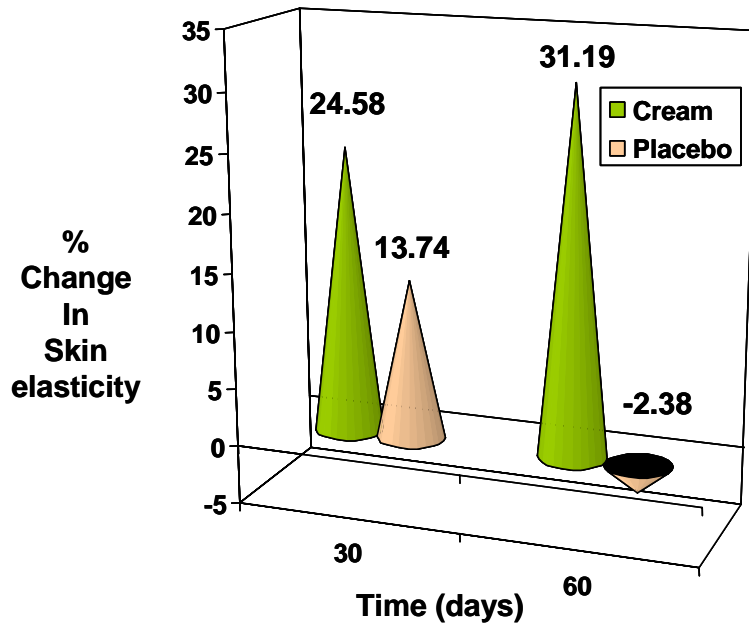


Figure 1: Effect of Cococin™ on the parameters of skin aging

The results of the study showed that treatment with the cream containing Cococin™ significantly improved skin elasticity, which was manifested in decreased skin roughness and improved skin tone. Thus Cococin™ nurtures keratinous tissue, and supports tissue integrity, thereby potentially inhibiting the appearance of the signs of aging and the manifestation of wrinkles.

Cococin™ can effectively be used for oral and topical applications and serves as a natural pool of nutrients and growth factors that support healthy aging.



Sample “after sun” skin cream preparation formulation:

	Ingredients	% w/w
A.	Paraffinum liquidum	10.0
	Petrolatum	1.5
	Acetylated Lanolin	2.2
	Lanolin Alcohol	1.4
	Laneth-10	0.5
	Glyceryl monostearate SE	3.0
B.	Carbomer (Carbopol 940)	0.1
	Sodium hydroxide (10%)	2.5
	Preservative	0.02-0.2
	Water (<i>aqua</i>)	qs 100.0
C.	Natural Sesamin Complex	0.5%
	Tetrahydropiperine	0.1%
D.	Cococin -Coconut (<i>Cocos nucifera</i>) fruit juice	2.0 ¹

Directions:

Blend phase A ingredients maintaining temperature at 80° C. Separately blend phase B ingredients at 80° C. Add phase C ingredients to blended phase A, maintaining the temperature at 80°C, with agitation, and mix the blended A + C with phase B in a homogenizer until thoroughly emulsified.

Adjust the pH to neutral with citric acid solution. Cool to 50° C. Add phase D slowly under homogenization. Cool to desired fill temperature. A sample cosmetic formulation appears in the table below.

¹ 25% colloidal suspension in 1,4 butylene glycol



Sample Nutricosmetic (Dietary supplement formulation):

Ingredient	Potential Functions	Quantity
Cococin	Hydration, nutritive support	75 mg
Tetrahydrocurcuminoids	Bioprotectant	75 mg
Triphala Extract	Cleansing	75 mg
Ginger Extract	Anti-inflammatory, digestive aid	20 mg
Multi-enzyme preparation	Digestive aid	30 mg
Black pepper extract	Bioavailability Enhancer	30 mg

Suggested use level: 1 tablet/capsule twice daily with meals

Sample Tangy-Sweet Natural Beverage Premix Formulation:

Ingredient	Weight %
Soluble starch/mannitol/other binder	62.0
Crystalline/granular Citric Acid	14.0
Tomato powder	5.0
Cococin	8.0
Banana (Musa indica) powder	6.0
CMC/Xanthan gum	0.5
Potassium Bicarbonate	4.0
Potassium citrate	0.2
Sodium/Potassium chloride	0.01
Flavors (black pepper/ginger)	0.4

100 g of the mix would yield about 28 servings of 250 ml each



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Cococin™

The Nourishment Factor®

Cococin™, The Nourishment Factor®, captures the goodness of green coconut water in a convenient powder form. Coconut water is the nutrient-rich liquid endosperm of coconut abounding in proteins, amino acids, sugars, vitamins, minerals and growth hormones that help to support cell growth and to hydrate the skin and hair. Coconut water solids are freeze-dried using a special process that preserves the activity of nutrients.



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