

**Development of Supplementary Wrapping Material from
Coconut Refuse for Fast Food Industry**

by

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**Thesis submitted to the University of Sri Jayewardenepura
for the award of the Degree of Masters of Science in Food
Science & Technology**

Declaration

The work described in this thesis was carried out by me under the supervision of Dr. S. B. Nawarathna and report on this has not been submitted in whole or in part to any university or any other institution for another Degree.

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We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.



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ACKNOWLEDGEMENT

I would like to express my heartfelt gratitude to my supervisor, Dr. (Mrs) Dr. S.B. Navarathne, Senior Lecturer, Department of Food Science and Technology, Faculty of Applied Science, University of Sri Jayewardenepura. I can't say thank you enough for his tremendous support and help. I feel motivated and encouraged every time by his advices. Without his encouragement and guidance my project would not be successful.

I wish to express my sincere gratitude to Mr. Annes Junaide, Managing Director at CBL Natural Foods, Minuwangoda, for the immense support given to me by critically evaluating my work while providing ample opportunities to engage my time at Quality Assurance department as well as in Dehydration production area for worthwhile causes.

My deepest gratitude is extended to Mrs. Samudra Fonseka, Department Quality Assurance, CBL Natural Foods, Minuwangoda, for devoting her valuable time to guide, advice and encourage me in making this research project a success. My grateful thanks also go to all the staff members in CBL Natural Foods, Minuwangoda, for their tremendous support and help.

The special thank goes to helpful lecturers, Dr. Indira Wickramasinghe, Senior Lecturer and Dr. Jagath Wansapala, Senior Lecturer and Course Coordinator, as well as Dr. Rupika for their valuable advices and also all the other academic, non-academic staff members and all the fellow research colleagues of Department of Food Science and Technology, University of Sri Jayewardenepura for their untiring support on numerous occasions for making this research project a success.

Last but not the least; I would like to show my greatest appreciation to my ever loving husband, parents, brother and sister for their assistance and encouragement during the whole period of my study.

ABBREVIATIONS

AOAC	-	Association of Analytical Communities
CBL	-	Ceylon Biscuit Limited
CFU	-	Colony Forming Unit
IBS	-	Irritable Bowel Syndrome
LLDPE	-	Linear Low Density Polyethylene
MPN	-	Most Probable Number
SLS	-	Sri Lanka Standard
TPC	-	Total Plate Count
U/P	-	Unprinted
VCO	-	Virgin Coconut Oil

ABSTRACT

Coconut was socially and culturally important for providing jobs and income to millions of people in worldwide. Coconut flour was naturally low in digestible carbohydrate, gluten free; cheaper than most of the other nut flours, which is loaded with health promoting fiber and important nutrients.

Main objective of the study was to prepare coconut wrap for the substitute to the wheat flour based products such as tortilla. According to the literature people tried coconut wrap with unripen coconut meat but it was not a 100% successful method due to unavailability, wastage and high cost of production. This study mainly focused on usage of by product, which was obtained from virgin coconut oil residues. Fulfillment of the major objective, first, carried out preliminary study to identify properties of raw materials. By using those raw materials desired product was developed. By following two factor factorial methods developed coconut wrapper modified by changing two variables namely coconut flour (commercial) and guar gum at two levels. According to the consumer preference further studies were carried out for the selected coconut wrapper. To meet other objectives of differential study, proximate analysis, cost analysis and shelf life determination of the developed product was conducted.

Cost per unit was Rs. 13.64 and it can drastically reduce, if this process carried out in large scale. Because, large drier, labour and cooker utilization cost calculate for one wrapper. Per serving can obtained 6.26g of protein, 2.26g of total fat, 11.40 g of carbohydrate, 9.09 g of total sugar, 1.33 g of dietary fiber, 27.82 mg of Sodium ion and 2.75 g of total ash. It is safe to consume due to 2.2×10^2 CFU/g of Total Plate Count (TPC) out of 5×10^3 CFU/g, Yeast and moulds < 10 CFU/g out of 100 CFU/g and negative in Coliform, *Escherichia coli* and *salmonella*. According to observations and results proven that coconut wrap shelf life should be maximum 9 months (36 weeks) in room temperature. Exposure to direct sun light and direct heat caused for colour change from light brown to dark brown.

CHAPTER 1

INTRODUCTION

Coconut was grown in all most 93 countries in worldwide. Not like oil palm, all around the world, coconut cultivation is increased only by 0.14% per annum within the 2001-2005 periods and production was grown up to 2.42% while countries like. India and Indonesia increased the area of coconut fields, Malaysia and Sri Lanka showed reducing number of acres.

Coconut was socially and culturally get together and providing jobs and income to millions of people in worldwide. In many countries' economies, it was the major source of revenue and is an integral part of the livelihood of the population (James et al., 1983). In many countries, despite the various benefits derived, the coconut was under threat due to several factors such as change of farmers' fields to other oil crops (eg: oil palm), urbanization, phytoplasma disease and vagaries of the market particularly the volatility of its various products in global trade. The decreased of interest on coconut cultivation reflected distinctively based on the trends in world production of some major vegetable oils not the coconut oil.

The Coconut (*Cocosnucifera* L.) was named as the "tree of life" with multifarious uses. The coconut provides a nutritious source of meat, juice, milk, and oil that has fed and nourished populations' around the world for generations. Approximately one third of the world's population depends on coconut to some degree for their food and economy. Coconut is rich source of fiber, vitamins, and minerals. It is also believed and act as a "functional food" because it provided many health benefits with beyond its nutritional content. It can improve digestion, protect against diabetes,

aided for regulate blood sugar, enhanced prevent heart disease and cancer, and aid in weight loss (Ramaswamy, 2013).

Coconut was naturally low in digestible carbohydrate, gluten free, it was more cheaper than most of the other nut flours, was loaded with health promoting fiber and important nutrients, and tastes terrific. Coconut flour was soft, flour like product made from the pulp of a coconut nut. Coconut flour was food-grade product obtained after drying, expelling and/or extracting most of the oil or milk from tender coconut meat.

Coconut flour was sub-classified according to its fat content. Those are low, medium and high fat. Protein content also subdivided to high protein and fiber content (high fiber). Another co-product is Virgin Coconut Oil (VCO). Coconut flour is excessively high in fiber with almost double the amount found in wheat bran. Coconut flour can be used as an alternative to the wheat flour to make a multitude of delicious pies, breads, cakes, cookies, snacks and desserts. It contains more calorie free fiber than other wheat alternatives. Coconut flour also considered as a good source of protein.

In this study reflect coconut wrap which contain, Low Carbohydrate, Gluten Free, Low Calorie. And coconut wrap was a replacement of Chinese roll outer casing or pancake. And it is also, nearly nine month shelf life without refrigerator. It was not included grain, less amount of Starch, diabetic friendly and delicious product. This coconut Wrap has revolutionized the paleo community. This coconut wraps is a convenient, tortilla alternative for busy lifestyle and work schedules. Whether gone to a restaurant or just gone to work, school, home or travelling abroad, these portable wraps can be used. With a shelf-life of approximately nine months, there is no need to refrigerate or freeze

those coconut wraps. This wraps can enjoy after storing in near room temperatures. Dehydration process acts as a natural preserver. But it should not be exposed to direct sunlight or high heat for extended time period. This wrap can consume after deep frying. When deep frying, this wrap act as chines roll outer casing or can directly consume with a savory filling or without any thing.

Key benefits of coconut wrap is higher the shelf life without refrigerated condition, high in calories, consumer awareness on coconut based products' benefits it can create high market share, ideal for stuffing whatever fit into wrap, minimal to no impact on blood sugar level and cholesterol level from Organic Unrefined Virgin Coconut Oil. Because Wrap is made out of organic coconut flour which is the byproduct of virgin coconut oil extraction, less than 0.5% guar gum & water. Cost of production also less than wheat flour alternatives due to usage of byproducts of virgin coconut oil. Aim of this study is to develop coconut wrap for the substitute to the wheat flour based products such as tortilla (directly with a savoury filling, pancake and Chinese roll outer casing). Wheat flour based products cannot keep for long time without refrigerated condition and high cost of production in Sri Lanka. Therefore, wheat flour is major import product due to unsuitable climatic condition to grow wheat in Sri Lanka. Not like wheat flour coconut flour having more health benefits. World trend is based on coconut base products due to its unique flavor and un- intended health benefits. Consumer demand raised through coconut based products.