

Development of ready to cook rice strings using plant based edible gum

BY

PASINDU B. ALWIS

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

UNIVERSITY OF SRI JAYAWARDENAPURA

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DECLARATION

The work described in this thesis was carried by me, under the supervision of Dr.(Mr.).S.B.Navaratne and the rept on this thesis has not been submitted in whole or in part of any university or any other institution for another Degree/Diploma.

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Date



Pasindu B. Alwis

By

Pasindu B. Alwis

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Approved by,

 12/12/2015

Dr. S.B. Navaratne

Internal Supervisor,

Dep. Of Food Science and Technology,

Faculty of Applied Science,

University of Sri Jayawardenapura,

Sri Lanka.

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ABSTRACT

String hoppers are one of the native food products available in Sri Lankan food profile. Which is made out of rice flour, salt and water. It's usually catering to the entire community without any social boundary. One of the disadvantages of string hoppers are low shelf life due to high moisture content. So its needed to preserve. Incorporation of edible plant gum is one of the best methods to preserve string hoppers. In this research, by incorporation of plant gums a new product produced named "rice strings". *Neolitsea involurate* - "Daul Kurundu" and *Abelmoschus esculentus* - "Okra" were used as the edible grade gum sources. Plant gums having high content of carbohydrates. So the moisture content is lower. Normal string hopper dough is mixed with normal water. Therefore the moisture content of string hoppers are higher with compared to instant rice strings. According to bendin and elasticity results Daul Kurundu incorporated rice strings having higher suitability to prepare ready to cook rice strings. Sensory evaluation having very similar results for both Daul Kurundu and Okra gum incorporated rice strings. But Okra incorporated rice strings having off white colour with compared to Daul Kurundu gum rice strings. By sensory evaluation with Daul Kurundu and normal string hopper, both got very similar results says both doesn't have any significant difference among hem. Therefore, instant rice strings having very close organoleptic properties with compared to normal string hoppers. So rice strings are suitable to implement in industrial scale.

ABBREVIATIONS

$^{\circ}\text{C}$ Degree of Celcius

g gram

L Liter

mL mili Liter

% percentage

Hrs Hours

μm micro meter

min minutes

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CHAPTER 1

INTRODUCTION

1.1 General Description

String hoppers are one of the native foods in Sri Lankan food profile. String hoppers also known as *Nooputt* (or Noolputtu) or *Idiyappam* (In Sinhala) is a traditional in Tamil, Kerala, Kodava, Tulu and Sri Lankan food consisting of rice flour pressed into noodles form and then steamed. They are also a culinary staple food in Tamil, Nadu, Kerala and Sri Lanka and southern areas of Karnataka. The name idiyappan derives from the Tamil/Malayalam words *idi*, meaning 'broken down' and *appam*, meaning 'pancake'. Pronounced as e-di-ap-pam. It is also frequently called as *noolputtu* from Malayalam/Tamil/Kannada/Kodava word *nool*, meaning "string or thread". String Hoppers are delicious and cheap food product that usually catering to the entire community without any social boundary.

History of string hoppers last for many centuries back form today. Written records are very rare to identify. But according to the book "The Story of our food" written by an eminent Indian food scientist and food historian K.T.Achaya, states that indiyappan or appam were already known in ancient Tamil country around 1st century as per preference in the Sangam literature.

Preparation of string hoppers are a very simple process. They are served hot or cool with the "sambal" or "kulambu" or "sothi" or all together as per the person's taste. It is served for breakfast and dinner as main food with hot chili coconut sambal, hot chili powder gravy ("Kulambu") or sweet tasting white gravy made with coconut milk ("Sothi"). This is a healthy

nutritional food if consumed in correct quantity. Apart from everyone's regular daily food, Iddiyappam is a preferred food for infants, elderly people and people who are recovering from illnesses. For infants it is mashed with banana and little sugar and given as meal in the morning and night. For elders and recovering people it served with "Sothi" or black pepper Juice (mulligatawny soup).

To make Iddiyappam it need following things, which are freely available in most of the Sri Lanka, Indian super markets worldwide.

1. "Idiyappa Ural" (Specially made wooden gadget)
2. "Idiyappa thattu" (Small trays, which can pass steam through it)
3. A steam pot

The rice flour must be steamed or roasted prior to making the Iddiyappam. This can be done in home or can be purchased from shops as ready to use rice flour. But it is better to shift that flour to remove unwanted impurities from the flour. String hoppers are disintegration during rehydration.

There are two main disadvantages in string hopper manufacturing industry. Most prior disadvantage is it's lower shelf life time. Since string hoppers are a hydroscopic food product, it tends to deteriorate during a short shelf life. So string hoppers needed to consume as soon as possible. Therefore, the product must need suitable precaution to prevent the deterioration. Also string hopper pressing is very difficult in large scale production.

Incorporation with edible food gums is one of the best method to increase the shelf life of the string hoppers. There are a wide variety of edible grade food gums available in Sri Lanka. Daul

Kurundu - *Neolitsea involurate*. Mostly used for the preparation of traditional food product, “Asmi”. And Ladies fingers/Okra - *Abelmoschus esculentus* are common available food gum sources in Sri Lanka.

1.2 Genaral Objective

To develop a method to prepare a ready to cook rice strings (String Hoppers) for the fast food industry using plant based edible gum, such as *Neolitsea involurate* - “Daul Kurundu” and *Abelmoschus esculentus* - “Okra”.

1.3 Specific objectives

- To identify particle sizes to make ready to cook string hoppers.
- To identify suitable drying method to dry rice strings.
- To identify suitable plant gum to make ready to cook rice strings.
- To compare physical properties such as strength and elasticity of the prepared instant rice string with string hoppers in the market.
- To find out chemical properties such as pH and moisture content of the prepared instant rice strings.

CHAPTER 2

LITERATURE REVIEW

2.1 History of String Hopper Industry.

According to the book “The Story of our food” written by an eminent Indian food scientist and food historian K.T.Achaya, states that *indiyappan* or *appam* were already known in ancient Tamil country around 1st century as per preference in the Sangam literature. So the history of string hoppers last for many centuries back from today although the written records are very rare to identify.

2.2 Major ingredients of rice strings.

2.2.1 Flour

Rice flour (also rice powder) is a form of flour made from finely milled rice. It is distinct from rice starch, which is usually produced by steeping rice in lye. Rice flour is a particularly good substitute for wheat flour. It consist of very low amount of gluten content. Rice flour is also used as a thickening agent in recipes.

Rice flour may be made from either white rice or brown rice. To make the flour, the husk of the rice or paddy is removed and raw rice is obtained, which is then ground to flour.

When preparing rice strings, clean rice is put into the water to be fully soaked in the water for hours and then it was ground to make flour. Flour is available in different particle sizes. Particle distribution is determined by shaking 100g of rice flour through 50, 70, 80, 200, and 250 mesh sizes. In here only microne 200 and microne 250 mesh sizes were used. Water absorption

capacity vary with the particle sizes of the flour. Microne 250 rice flour having higher water absorption capacity than microne 200 rice flour. Then rice flour is steamed or roasted prior to making the rice strings. This is normally done in home or can be purchased from shops as ready to use rice flour. Seiving method is the best method for determining particle size distribution of rice flour. Separation is based on difference in particle size of product and contaminant using standard test sieves.

2.2.2 Salt

From the culinary perspective, salt has many desirable properties. Added salt improves the sensory properties of virtually every food that humans consume, and it is cheap. There are many reasons for adding salt to foods. The main reason is that, in many cases, added salt enhances the positive sensory attributes of foods, even some otherwise unpalatable foods; it makes them “taste” better. For people who are accustomed to high levels of salt in their food, its abrupt absence can make foods “taste” bad. If we are to successfully lower salt consumption in the population as a whole, it will be necessary to reduce salt levels in the human food supply with careful attention to their flavor-enhancing properties. Consideration of what is known about the effects of salt on food and flavor perception and why people like foods with added salt can help to inform efforts to lower salt consumption. Further, knowledge of how salt is detected by sensory receptors may aid in developing salt substitutes or enhancers that could contribute to an overall reduction of salt in the food supply.

Salt is added as per taste. There are also several other importance of using salt while making the dough. Salt affects dough texture, making it stronger and less sticky. Salt reduces oxidation of the dough during mixing and affects shelf life of the food material.

2.3 Gums and Musilage

Food gums are complex carbohydrates which are derived primarily from plants and used as thickeners, gel forming agents, and/or stabilizing agents in food. They increase the viscosity and pseudo plasticity (increased flow with applied force) of aqueous solutions. Food gums are also called hydrocolloids, which means that they are soluble in water (“hydro” means water and “colloid” means dispersion of small particles in another medium). Food gums help to give many of the foods we eat and their characteristic shape or consistency. (fathom 2011: Williams & Phillips. 2000).

Food gums have an ability to stabilize liquids, thereby allowing other ingredients to be dispersed and suspended in the solution. They can also be used as an emulsifier, which means they disperse fat to allow it to become more water-soluble.

They perform numerous functions in foods and have little or no flavor, so their use does not change the taste of the food to which it is added. Additionally, gums are a good source of dietary fiber and can be used in reduced calorie foods to replace fat. The majority of food gums are considered natural and many also are approved for use in “organic” and “made with organic” for foods and beverages. Gums are often used in gluten-free foods, since people who cannot tolerate gluten can generally tolerate food gums. Food gums are non-allergenic and non-toxic.

Plant gums come from all over the world, from both the land and the sea. For example, carrageenan and alginates come from seaweed. Many food gums come from plants, such as guar, locust bean gum, pectin and gum arabic. Some food gums are derived by microbial fermentation (e.g. xanthan) while others are synthesized, such as (cellulose gum). Others, such as gelatin are derived from animal tissue.