

# **Development of Natural Flavoured Vinegar**

**By**



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**Thesis submitted to the University of Sri Jayewardenepura as the partial fulfillment requirement for the award of the degree of Masters of Science in Food Science and Technology.**

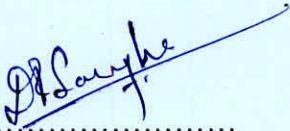
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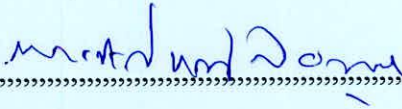
## DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr. Jagath Wanshapala, Department of Food Science and Technology, university of Sri Jayewardenepura, and report has not been submitted to any other University for another degree

A handwritten signature in blue ink, appearing to read 'D.I. Samarasinghe', written over a horizontal dotted line.

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This is to certify that above statement made by the candidate is true and suitable for submission to the University for the purpose of evaluation,



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# DEVELOPMENT OF NATURAL FLAVOURED VINEGAR

## ABSTRACT

The research has been launched with the intention of developing natural flavoured vinegar as a micro nutrition supplement, food flavour enhancer and also a preservative. This is to make a point to understand the value of flavoured vinegar as it is not much popular within Sri Lanka. As this is a micro nutritional supplement, it will be more advantageous to make a best introduction of spicy and herbal flavoured vinegar for day-to-day use of general public. This is a supportively effect on the appetite of the people on food. It will be more beneficial for prevention of disease as well.

35 different samples of lime juice and sugar solutions were prepared as initial solutions. Samples were allowed to alcoholic fermentation after adding yeast (*Saccharomyces spp.*). The alcohol contents of the samples were measured .All samples were filtered and cleaned. They were allowed to the acetic acid fermentation for about three months after adding *Acetobacter aceti* as acidifying culture. Alcohol content and total acid content were measured and ten samples were selected within the range of good acidity. Sensory evaluation was done for these ten samples and best formulae were selected for lime vinegar.

Then the flavouration of the selected sample was carried out. This was carried out mainly by three steps. First, the best amount of herbal material (Iriveriya) was determined by preparing three samples of herbal vinegar by varying the amount of herbs. A sensory evaluation was done and the best formulae was selected. In second step, the best amount of spices was determined by preparing three samples of spicy vinegar by varying the amount of spices. A sensory evaluation was done and the best formulae was selected. In third step, the different volumes of lime vinegar were flavoured with selected best amount of herbs and spices and sensory evaluation was done with the market vinegar sample. The alcohol content was determined in the final flavoured vinegar sample. The shelf life of the developed flavoure vinegar was determined by the accelerated shelf life determination method

# CHAPTER 1

## INTRODUCTION

### 1.1 Vinegar

Vinegar is a liquid consisting mainly of acetic acid ( $\text{CH}_3\text{COOH}$ ) and water. Produced from various sugary and starchy materials by alcoholic and subsequent acetic fermentation and contains a minimum of 4% acidity. Vinegar is now mainly used as a cooking ingredient, which continued mostly as a mild acid. It is still promoted today in a variety for industrial, medicinal and domestic uses. (White.J (1970), Process Biochem.,)

Commercial vinegar is produced either by fast or slow fermentation processes. Generally, slow methods are used with traditional vinegar, and fermentation proceeds slowly for months or a year. The longer fermentation period months for a year. The longer fermentation period allows for the accumulation of a nontoxic slime composed of acetic acid bacteria. Fast methods are added to mother of the vinegar (bacteria culture) to the source liquid before adding air using a venture pump system or a turbine to promote oxygenation to obtain the fastest fermentation. In fast production processes, vinegar may be produced in a period ranging from 20 hours to three days.. (White.J (1970), Process Biochem.,)

### 1.2 Formation of Vinegar

Starch containing materials that are usually hydrolysed into sugars and subsequently fermented with requisite yeast species to produce alcohol. In alcoholic fermentation, Sugar is converted chiefly by anaerobic fermentation in accordance with Embden – Meyerhof scheme to ethyl alcohol and carbon-dioxide. The ethyl alcohol is oxidized by the oxygen in the air in the presence of micro-organisms to acetic acid. The fermentation of alcoholic and acetic cannot continue simultaneously because of the acetic acid formed by the vinegar micro-organisms retarded yeast growth and activity.

In lime and sugar based wine the predominant yeast species responsible for alcoholic fermentation is *Schizosaccharomyces pombe*. Other responsible micro-organisms are *Saccharomyses cereviciae*, the biochemical changes involved in the transe formation of sucrose to ethanol and carbon-dioxide under anaerobic fermentation and the



further oxidation of ethanol to acetic acid by aerobiosis. These are the members of the genus *Acetobacter* and including several species *Acetobacter aceti*, *A. xylinum*, *A. kiitzingianuum*, *A. pasturianum*, *A. curvum*

### **1.3 Flavoured Vinegar**

Flavour is one of the characteristics of any material taken in the mouth perceived mainly by the senses of taste and smell, and also the general pain and tactile receptors in the mouth, are influenced by the brain. The perception of flavour is a property of flavouring. Flavours are products that are added to food to impart, modify, or enhance the flavour of food. They can be, natural flavouring substances formed by enzymatic or microbiological processes, from material of plant or animal origin. Synthetic flavouring substances are flavouring substances formed by chemical synthesis substances.

Flavoured vinegars can be used in any recipe that calls for plain vinegar. Flavoured vinegar is easier and safer to make, because vinegar is high in acid. It does not support the growth of *Clostridium botulinum* like severe bacteria. They add zest to marinades for meats and fish and interesting flavours to dressings for salads, pastas and vegetables add excitement to salads, marinades and sauces.

### **1.4 Objectives of the study**

**Major Objective :**

**To Develop a Flavoured Natural Vinegar**

**Minor Objectives :**

To analyse the properties of vinegar by sensory evaluation.

To determine the shelf life of vinegar

To do a cost benefit analysis

To determine suitable packing material.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Vinegar

Vinegar is a product of the alcoholic and acetous fermentation of a saccharine solution without any intermediate distillation (Rowse *et al.* (1970). It is an alcoholic liquid that has been allowed to sour. It is primarily used to flavour and preserve foods as an ingredient in salad dressings and marinades. Vinegar is also used as a cleaning agent. The word is from the French *vin* (wine) and *aigre* (sour) (Pownat.V.T, 1997;Ghommidh *et al*1982;)

##### 2.1.1 History of Vinegar

Vinegar is the world's oldest cooking ingredient and food preservation method. According to the Vinegar Institute (Vinegar Institute 2005),The use of vinegar can be traced 10,000 years. In fact, flavoured vinegar has been manufactured and sold for almost 5,000 years. The wide variety of vinegar available today is nothing new. Until the six century BC, the Babylonians were making and selling vinegar flavoured with fruit, honey, malt, etc. to gourmets of the time. In addition, the Old Testament and Hippocrates recorded the use of vinegar for medicinal purposes (Kehrer 1921; Conner 1976). There are other historical reports about vinegar. Albucazes in 1100 made the statement that colourless vinegar must be distilled on a low fire. BasiliusVenlentinus, a monk, in the fifteenth century found that by distilling weak vinegar, a stronger product could be obtained (Kehrer 1921; Joslyn 1955;). The Geber in the seventeenth century discovered increasing the strength of wine vinegar by distillation. Chemist Stahl in the first half of eighteenth century discovered the sour principle of vinegar was acetic acid. In 1790, 5 Loewitz, reported that running weak acetic acid over charcoal would strengthen it. Durande in 1778 made a more concentrated product and called it glacial acetic acid. The first complete analysis of acetic acid was made by Berzelios in 1814. Dobereiner proved that alcohol was oxidized at the expense of oxygen and produced acetic acid and water. In 1823 Schutzenbach introduced the quick process of manufacturing vinegar based on Dobereiner's theory of formation of acetic acid from alcohol (Conner.H.A, Allgerier.R.T., 1976;Joslyn 1955;San Chiang Tan B.S 2003;)