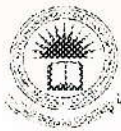


**PREPARATION AND STORAGE OF PINEAPPLE
BLEND WATERMELON READY-TO-SERVE
(RTS) BEVERAGE**

BY

SARANYAH KANGESU



FAG347



Project Report
Library - EUSL



FACULTY OF AGRICULTURE

EASTERN UNIVERSITY

SRI LANKA

2013

PROCESSED

ABSTRACT

Watermelon (*Citrullus lanatus*) is one of the under-utilized fruit having nutritional and medicinal values. Only a few value added products of watermelon fruit are available in the market of Sri Lanka. There is a need for the development of more value added products using this fruits. A Ready-To-Serve (RTS) fruit beverage is becoming popular among Sri Lankans which can be produced with simple and low cost technology. Therefore, this study was carried out to develop a RTS beverage using watermelon fruit juice.

Six recipes of pineapple blend watermelon RTS beverage (RTS beverage of 70, 75, 80, 85, 90 and 100% of watermelon juice and 10, 15, 20, 25 and 30% of pineapple juice were prepared with sugar, citric acid and 70 ppm of Sodium Metabisulphite (SMS), considering the findings of preliminary studies and Sri Lanka standards (SLS 729:1985) for RTS fruit beverages. The RTS beverages were assessed for physio-chemical qualities, organoleptic characters and microbial test to evaluate the suitability of these beverages for consumption and for long shelf life.

The physio-chemical (titrable acidity, ascorbic acid, pH, total soluble solids (TSS) and total sugars) and organoleptic (colour, aroma, taste, consistency, absence of off-flavour and overall acceptability) qualities and total plate count were analyzed after formulation and during storage. The titrable acidity, ascorbic acid, total soluble solids (TSS) and total sugars of freshly made pineapple blend watermelon RTS beverages increased while pH decreased with the increased concentration of pineapple juice from 10-30%. Nine point hedonic scale ranking method was used to evaluate organoleptic characters. According to Tukey's test, the mean scores for all assessed

sensory characters varying significantly ($p < 0.05$) in the freshly made pineapple blend watermelon RTS beverages.

Based on the quality characters, the most preferred pineapple blend watermelon RTS beverages with 85% watermelon juice and 15% pineapple juice, 80% watermelon juice and 20% pineapple juice and 75% watermelon juice and 25% pineapple juice combinations were selected and subjected to storage studies in ambient temperature of 30°C. Analysis was carried out 2 weeks interval throughout the experiment period of 3 months.

The findings of the storage study revealed that, the decline trend was observed in the ascorbic acid, pH, total soluble solids (TSS) and total sugars with storage period and an increasing trend was observed in titrable acidity with storage period for all the treatments. The results of physio-chemical analysis revealed that, there were significant differences ($p < 0.05$) between the treatments and the period of storage the sensory analysis also showed that there were significant differences ($p < 0.05$) for the organoleptic characters between the treatments. The highest overall acceptability was observed in the RTS beverage with 80% watermelon juice and 20% pineapple juice combinations.

Based on the results of physio-chemical characters, sensory attributes and microbial tests, the RTS beverage with 80% watermelon juice and 20% pineapple juice combinations as the best treatment. This RTS beverage could be stored at ambient condition for 3 months without significant losses in quality attributes.

TABLE OF CONTENTS

ABSTRACT.....	I
ACKNOWLEDGEMENT	II
TABLE OF CONTENTS.....	IV
LIST OF TABLES	XI
LIST OF FIGURES.....	XII
LIST OF PLATES.....	XIII
CHAPTER 01 - INTRODUCTION.....	1
CHAPTER 02 - LITERATURE REVIEW	5
2.1 WATERMELON	5
2.1.1 Taxonomy	5
2.1.2 Origin and distribution.....	5
2.1.3 Description	5
2.1.4 Economic Importance and uses of Watermelon.....	6
2.1.5 Varieties	7
2.1.6 Cultivation.....	8
2.1.6.1 Sri Lanka.....	8
2.1.6.2 World.....	9
2.2 FLOWERING, FRUITING, HARVESTING AND YIELD	9
2.2.1 Flowering.....	9
2.2.2 Fruiting	9
2.2.3 Harvest index and harvesting methods.....	9
2.2.4 Yield and Storage.....	10

2.3 WATERMELON FRUIT	10
2.3.1 Watermelon Composition	10
2.3.2 Lycopene	11
2.3.3 Sugar	12
2.4 WATERMELON JUICE	12
2.4.1 Watermelon juice extraction methods.....	12
2.4.2 Limitation in watermelon juice extraction	13
2.5 PINEAPPLE	13
2.5.1 Description.....	13
2.5.2 Pineapple juice and its composition.....	13
2.6 BLENDED JUICE.....	14
2.6.1 Postulating of blending	14
2.6.2 Importance of blend juices	15
2.7 READY-TO-SERVE (RTS) FRUIT BEVERAGES.....	16
2.7.1 Basic Ingredients of RTS Beverages.....	16
2.7.1.1 Fruit.....	16
2.7.1.2 Sweetening ingredients	16
2.7.1.3 Portable water	16
2.7.2 Optional ingredients of RTS beverages	17
2.7.2.1 Preservatives.....	17
2.7.2.2 Acidulants	17
2.7.2.3 Others.....	17
2.7.3 Requirements to be fulfilled in RTS Beverages	17

2.7.3.1 Fruit ingredient.....	17
2.7.3.2 Appearance.....	17
2.7.3.3. Flavour and odour.....	18
2.7.3.4 Packaging material.....	18
2.7.3.5 Other Ingredients.....	18
2.7.4 Specification of RTS fruit beverages.....	18
2.8 PREPARATION OF RTS FRUIT BEVERAGES.....	18
2.8.1 Selection of Fruits.....	18
2.8.2 Cleaning of Fruits.....	19
2.8.3 Preparation of juice.....	19
2.8.4 Mixing.....	19
2.8.5 Heating.....	19
2.8.6 Hot filling.....	19
2.8.7 Capping.....	19
2.9 MICROBIOLOGY OF FRUIT DRINKS.....	20
2.9.1 Microbiology Limits of the RTS Fruit Beverages.....	21
2.10 SENSORY EVALUATION.....	22
2.10.1 Tests used to achieve the objective.....	22
2.10.1.1 Hedonic Rating Test.....	22
2.10.2 Qualities assessed by sensory tests.....	23
2.10.2.1 Colour.....	23
2.10.2.2 Taste.....	24
2.10.2.3 Aroma.....	24
2.10.2.4 Absence of off-flavour.....	24
2.10.2.5 Consistency.....	24
2.10.2.6 Overall acceptability.....	24

2.10.3 Benefits of using Sensory Evaluation	25
2.10.4. Problem associated with Sensory Evaluation	25
2.10.5. Rules of Sensory Evaluation.....	26
CHAPTER 03 - MATERIALS AND METHODS	27
3.1 MATERIALS.....	27
3.1.1 Materials used for the Study.....	27
3.1.2 Materials collection.....	27
3.2 METHODS	28
3.2.1 Preparation of Raw materials.....	28
3.2.1.1 Extraction of watermelon juice	28
3.2.1.2 Extraction of pineapple juice	28
3.2.1.3 Preparation of RTS beverage	28
3.2.2 Sterilization glass bottles	29
3.2.3 Sterilization of other equipments and materials	29
3.3. PRELIMINARY STUDIES.....	29
3.3.1 Development of Pineapple blend Water melon RTS Beverage Recipes.....	29
3.4 CHEMICAL ANALYSIS OF PINEAPPLE BLEND WATERMELON RTS BEVERAGES.....	30
3.4.1 Determination of Titrable acidity.....	31
3.4.1.1 Principle	31
3.4.1.2 Materials.....	31
3.4.1.3 Procedure	31
3.4.1.4 Calculations.....	32
3.4.2 Determination of pH	32
3.4.2.1 Materials	32

3.4.2.2 Procedure	32
3.4.3 Determination of Ascorbic Acid.....	32
3.4.3.1 Principle	32
3.4.3.2 Materials.....	33
3.4.3.3 Procedure	33
3.4.3.4 Calculation	33
3.4.4 Determination of Total Soluble Solids.....	34
3.4.4.1 Materials.....	34
3.4.4.2 Procedure	34
3.4.5 Determination of Total Sugar (Lane-Eynon method).....	34
3.4.5.1 Principle	34
3.4.5.2 Material	34
3.4.5.3 Procedure	35
3.4.5.4 Calculation	35
3.5 STORAGE STUDIES.....	35
3.6 MICROBIOLOGICAL TEST	36
3.6.1 Preparation of Nutrient Agar	36
3.6.2 Preparation and Dilution Series of the RTS	
Beverage sample	36
3.6.3 Inoculation	37
3.6.4 Identification of Microbes.....	37
3.7 SENSORY EVALUATION.....	37
3.7.1 Materials for Sensory Evaluation.....	38
3.7.2 Coding the Samples.....	38
3.7.3 Serving the Samples.....	38
3.8 STATISTICAL ANALYSIS	39

CHAPTER 04 - RESULTS AND DISCUSSION 40

4.1 PREPARATION OF PINEAPPLE BLEND WATERMELON

RTS FRUIT BEVERAGE 40

4.2 PRELIMINARY STUDIES..... 40

4.3 QUALITY CHARACTERISTICS OF FRESHLY MADE

RTS BEVERAGES..... 41

4.3.1 Chemical Qualities of Freshly Made

RTS Beverages 41

4.3.1.1 Titrable Acidity 41

4.3.1.2 Ascorbic Acid..... 42

4.3.1.3 pH 43

4.3.1.4 Total Soluble Solids (TSS)..... 44

4.3.1.5 Total sugar..... 44

4.3.2 Sensory qualities of Freshly Made RTS Beverages..... 45

4.3.2.1 Colour 45

4.3.2.2 Aroma 46

4.3.2.3 Taste..... 46

4.3.2.4 Consistency 46

4.3.2.5 Absence of off-flavour..... 48

4.3.2.6 Overall acceptability..... 48

4.4 CHANGES IN QUALITY CHARACTERISTICS OF RTS

BEVERAGES DURING STORAGE..... 48

4.4.1 Chemical Qualities of Beverages at storage 48

4.4.1.1 Tirable Acidity 49

4.4.1.2 Ascorbic Acid..... 50

4.4.1.3 pH 51

4.4.1.4 Total sugar.....	52
4.4.1.4 Total Soluble Solids (TSS).....	52
4.4.2 Sensory qualities of RTS Beverages during Storage	53
4.4.2.1 Colour	55
4.4.2.2 Aroma	55
4.4.2.3 Taste.....	55
4.4.2.4 Consistency	55
4.4.2.5 Absence of off-flavour.....	55
4.4.2.6 Overall Acceptability	56
4.5 MICROBIOLOGICAL TESTS FOR RTS BEVERAGES.....	56
4.5.1. Microbial Test for Freshly Made RTS Beverages	56
4.5.2 Microbial Test for RTS Beverages Stored at Ambient Temperature after One Month.....	57
4.5.3 Microbial Test for RTS Beverages Stored at Ambient temperature after Two month.....	58
4.5.4 Test for RTS Beverages Stored at ambient Temperature after Three Months	58
CHAPTER 05 - CONCLUSION	59
SUGGESTION FOR FUTURE RESEARCH.....	61
REFERENCES	62
APPENDIX	