

TECHNOLOGICAL STUDIES ON PROCESSING OF SOME NON-TRADITIONAL FRUITS

By

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B.Sc. Agric. Sc. (Food Sciences), Fac. Agric., Cairo Univ., Egypt, 1996.

M.Sc. Agric. Sc. (Food Sc. and Tech), Cairo University, 2010.

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ABSTRACT

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The present study was carried out to throw some light on the best ways to process some non-traditional fruits, to demonstrate their functional properties and changes induced in manufactured products and their induced application in some of the food product to improve their nutritional and their functional properties. Therefore, acerola, annona, and cactus pear fruits were evaluated for their phenolic and flavonoid contents as well as antioxidant activities in terms of scavenging DPPH free radicals. Acerola juice showed a high content of vitamin C, and total phenolic content comparing with its freeze-dried powder in fresh acerola juice and its freeze-dried powder. On the other hand, freeze-dried powder of acerola contained, oxalic, mallic, lactic, acetic and propionic.

Annona juice and its freeze-dried powder, had ascorbic acid content measured by HPLC recorded 6.93 and 27.85 mg/100gm respectively, the free radical scavenging activity clearly increased in freeze-dried annona powder compared to fresh juice. Total phenolic contents in fresh annona juice and its freeze-dried powder were (9.95 and 32.6 mg/100g) as gallic acid, respectively. Annona fresh juice contained seven organic acids compound and its freeze dried powder had five organic compounds. Red cactus juice and its freeze-dried powder had a high content from betacyanins, betaxanthins and total betalins comparing with yellow cactus juice and its freeze-dried powder and had a higher content of antioxidant activity 92% compared with yellow cactus juice 71.93%.

The rheological characteristics of fresh and reconstituted juices were measured for acerola, annona and cactus fruits at 25°C. The relationship between the applied shear rates and the corresponding shear

stress response was not linear indicating the non-Newtonian behavior of the juices obtained from these fruits. According to power law equation, the n-value (flow behavior index) of tested juices was in the range of 0.222 to 0.520 indicating the pseudoplastic behavior of the tested fruit juices. The highest values of consistency coefficient (K-value) were recorded for acerola juice ($14.7 \text{ Dynes.s}^n / \text{cm}^2$), while the lowest values were recorded for the enzymatic treatment of red cactus juice ($4.766 \text{ Dynes.s}^n / \text{cm}^2$). The rheological parameters of the reconstituted freeze dried juices showed that the n-values were in the range of 0.562 to 0.695, being higher than their corresponding n-values of the fresh juices. The highest values of consistency coefficient (K-value) of the reconstituted juices were recorded for yellow cactus while the lowest values were recorded for annona

The highest amount of absorbed moisture ($0.3907 \text{ g H}_2\text{O/g DM}$) was recorded for powders of yellow cactus juice due to its higher sugar content compared with the other tested powders. Sorption isotherms curves were analyzed according to the different sorption isotherms equation applied like: BET, Halsey, Smith, Oswin, Henderson and GAB-models.

On the other hand, the results showed that supplementation of strawberry jams with freeze dried tropical fruits powder during processing, enriched these products in bioactive compounds. Also, supplementation of jams with freeze dried powder of the treated fruits had a good effect on color and antioxidant activity. The strawberry jam made with freeze dried tropical fruits powder had a higher polyphenolic content and antioxidant activity. Therefore, this jam can be used as a good source of antioxidants in our diet and may have relevance in the prevention of diseases in which free radicals are implicated.

Keywords: Acerola, Cactus pear, Annona, Freeze drying, Rheology, Apparent viscosity, Antioxidant activity.

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CONTENTS

	Page
LIST OF TABLES.....	V
LIST OF FIGURES	VIII
LIST OF ABBREVIATIONS.....	X
1. INTRODUCTION.....	1
2. REVIEW OF LITERATURE.....	5
2.1. Acerola Fruit (<i>Malpighia glabra L.</i>)	5
2.1.1. Phytochemical and Nutrient composition of acerola fruit	6
2.1.2. Antioxidant capacities of acerola juice.....	7
2.1.3. Freeze-drying process of acerola juice.....	9
2.1.4. Rheological properties of acerola juice.....	10
2.2. Annona fruit (<i>Annona Squamosa L.</i>)	11
2.2.1. Phytochemical and Nutrient composition of Annona fruits	13
2.2.2. Antioxidant capacities of Annona fruits.....	14
2.2.3. Freeze-drying process of Annona fruits.....	14
2.2.4. Rheological properties and sorption isotherms of annona	15
2.3. Cactus pear (<i>Opuntia ficus-indica</i>) fruits.....	17
2.3.1. Phytochemical and nutrient composition of cactus pear juice	19
2.3.2. Antioxidant capacities of cactus pear fruits.....	20
2.3.3. Freeze drying process of cactus pear fruits.....	21
2.3.4. Thermal and rheological properties of cactus pear	21
2.4. Application of tropical fruits in strawberry jam	22
3. MATERIALS AND METHODS.....	27
3.1. MATERIALS.....	27
3.1.1. Fruits.....	27
3.1.2. Chemicals.....	27
3.2. Methods.....	27
3.2.1. Preparation of acerola juice.....	27
3.2.2. Preparation of annona juice	28
3.2.3. Preparation of cactus Juice.....	29

	Page
3.2.4. Freeze-drying process for fruit juices	30
3.2.5. Processing of strawberry jam.....	31
3.3. Methods of analysis.....	31
3.3.1. Moisture content.....	31
3.3.2. Total Ash.....	31
3.3.3. Total soluble solids content (T.S.S.).....	31
3.3.4. pH value	32
3.3.5. Total acidity	32
3.3.6. Determination of sugars.....	32
3.3.7. Determination of organic acids.....	32
3.3.8. Determination of ascorbic acid.....	32
3.3.9. Determination of phenolic and flavonoid compounds.....	33
3.3.10. Determination of flavonoid compounds.....	34
3.3.11. Determination of total phenolic content.....	34
3.3.12. Determination of total phenolic content for jam.....	34
3.3.13. Determination of total flavonoid content for jam.....	35
3.3.14. Analysis of Betalins pigments.....	35
3.3.15. Determination of total anthocyanins.....	36
3.3.16. Measurement of antioxidant activity.....	36
3.3.17. Color measurement	37
3.3.18. Determination of color index.....	37
3.3.19. Apparent viscosity of fruit juices and freeze dried powder	37
3.3. 20. Determination of hydration capacity of fruits powders	38
3.3.21. Determination of equilibrium moisture contents for freeze dried powders of fruits	38
3.4. Sensory evaluation for jam samples.....	41
3.5. Statistical analysis procedure.....	41
4. RESULTS AND DISCUSSION.....	42
4.1. Some physico-Chemical characteristics fresh acerola juice and its freeze-dried powder.....	42

	Page
4.1.2. Identification of organic acids in fresh acerola juice and its freeze-dried powder by HPLC.....	47
4.1.3. Identification of phenolic compounds in fresh acerola juice and its freeze-dried powder by using HPLC.....	49
4.1.4. Identification of flavonoid compounds for acerola juice and its freeze dried powder compounds	52
4.1.5. Effect of using the freeze-drying process on the color attributes of the fresh acerola juice.....	54
4.2. Some physio-chemical characteristics of annona extract and it is freeze-dried powder.....	55
4.2.1. Identification of organic acids content of annona extract and its freeze-dried powder by HPLC.....	58
4.2.2. Identification of phenolics compounds for annona extract and freeze dried powder.....	61
4.2.3. Identification of flavonoid compounds in fresh annona juice and its freeze-dried powder.....	64
4.2.4. Effect of using the freeze-drying process on the color attributes of the fresh annona juice.....	65
4.3.1. Physico-chemical properties of red and yellow cactus juice and their powders.....	66
4.3.2. Identification of organic acids compounds for red and yellow cactus juice and their powder.....	72
4.3.3. Identification of phenolics compound for red and yellow cactus and their powder.....	76
4.3.4. Identification of flavonoids compounds for yellow cactus juice and their powder.....	80
4.3.4. Effect of using the freeze-drying process on the color attributes of the fresh red and yellow cactus juice.....	85
4.4. Flow properties and sorption iso therm of the tested of fruits.....	85

	Page
4.4.1. Rheological characteristics of reconstituted juice from freeze- dried powders.....	89
4.5. Sorption characteristics of juice powders obtained from acerola, annona and cactus fruits.....	93
4.6. Utilization of freeze dried tropical fruits powder in jam processor.....	98
4.6.1. Effect of freeze dried tropical fruits addition the antioxidant status of strawberry samples	98
4.6.2. Color parameters of strawberry jam sample	99
4.6.3. Organoleptic evaluations strawberry jam samples	100
5. SUMMARY.....	102
6. REFERENCES.....	110
ARABIC SUMMARY	

LIST OF TABLES

No.		Page
1	Saturated salts solutions and their equilibrium relative-humidity	39
2	Some physico and chemical properties of fresh acerola and their freeze dried juice.....	44
3	Identification of organic acids for acerola juice and freeze dried powder.....	46
4	Identification of phenolic compounds in fresh acerola juice and its freeze-dried powder by using HPLC.....	49
5	Identification of flavonoid compounds for acerola juice and freeze dried powder by HPLC.....	51
6	Effect of using the freeze-drying process on the color attributes of the fresh annona juice.....	54
7	Some physio-chemical characteristics of annona extract and its freeze-dried powder.....	56
8	Identification of organic acids for Annona extract and its freeze dried powder by HPLC.....	58
9	Identification of phenolic compounds in annona extract and its freeze-dried powder by using HPLC.....	61
10	Identification of flavonoids compounds for annona extract and its freeze dried powder by HPLC.....	63
11	Effect of using the freeze-drying process on the color attributes of the fresh annona juice.....	65
12	Some physico and chemical properties of red and yellow cactus juice and powder.....	69
13	Identification of organic acids in red and yellow cactus juice and its powder by HPLC.....	73
14	Identification of phenolics compound for red and yellow cactus juice and freeze dried powder by HPLC.....	77

No.		Page
15	Identification of flavonoid compounds in red and yellow cactus juice and its freeze dried powder by HPLC	81
16	Effect of using the freeze-drying process on the color attributes of the fresh red and yellow cactus juice.....	85
17	Flow parameters of juices obtained from Acerola, Annona and cactus fruits.....	88
18	Flow parameters of fruit juices obtained from reconstituted acerola, annona, and cactus powders.....	92
19	Estimated parameters for GAB, Henderson, Halsey, Oswin, Smith and BET for dried juices at 25°C.....	93
20	antioxidant status of strawberry jam fortified with freeze dried tropical fruits powder.....	99
21	Color parameters of strawberry jam fortified with freeze dried tropical fruits powder.....	100
22	Sensory attributes of strawberry jam fortified with freeze dried tropical fruits powder.....	101

LIST OF FIGURES

No.		Page
1	Acerola fruit.....	6
2	Annona fruit.....	12
3	Cactus fruits.....	17
4	Processing steps of freeze dried acerola juice.....	28
5	Processing steps of freeze dried annona juice	29
6	Processing steps of freeze dried cactus juice.....	30
7	Determination of ascorbic acid in acerola juice (a) and its freez-dried powder (b).....	45
8	Identification of organic acids for acerola juice (a) and its freeze-dried powder (b) by HPLC.....	47
9	Identification of phenolic compounds in fresh acerola juice (a) and its freeze-dried powder (b) by using HPLC.....	50
10	Identification of flavonoid compounds in fresh acerola juice and its freeze-dried powder by using HPLC.....	52
11	Determination of ascorbic acid for anonna extract (a) and its freez-dried powder(b) by HPLC.....	57
12	Identification of organic acids for Annona extract (a) and its freeze dried powder(b) by HPLC.....	59
13	Identification of phenolic compounds in annona extract (a) and its freeze-dried powder (b) by using HPLC.....	62
14	Identification of flavonoids compounds for annona extract (a) and its freeze dried powder (b) by HPLC.....	64
15	Determination of ascorbic acid in red cactus juice (a) and its freeze-dried powder (b).....	70
16	Determination of ascorbic acid in yellow cactus juice (a) and its freeze-dried powder (b).....	71
17	HPLC chromatogram organic acids for red cactus juice and powder.....	74

VIII

No.		Page
18	Determination of ascorbic acid in yellow cactus juice (a) and its freeze-dried powder (b).....	75
19	Rheological characteristics of acerola and annona juices....	78
20	Rheological characteristics of yellow and red cactus juice..	79
21	Rheological characteristics of cactus juices before and after enzyme treatment.....	82
22	Rheological characteristics of reconstituted acerola juice from freeze dried.....	83
23	Rheological characteristics of reconstituted annona juice from freeze dried.....	86
24	Rheological characteristics of reconstituted yellow cactus juice from freeze dried.....	87
25	Rheological characteristics of reconstituted red cactus juice from freeze dried.....	88
26	Sorption isotherm of acerola powder.....	89
27	Sorption isotherm of annona powder.....	90
28	Sorption isotherm of red cactus powder.....	90
29	Sorption isotherms of yellow cactus powder.....	91
30	Sorption isotherm of acerola powder.....	96
31	Sorption isotherm of annona powder.....	96
32	Sorption isotherm of red cactus powder.....	97
33	Sorption isotherms of yellow cactus powder.....	97

LIST OF ABBREVIATIONS

AA%	: Antioxidant activity
Abs	: Absorbance
AOAC	: Association of Official Analytical Chemists
β	: Beta
°C	: Centigrade degree
CAE	: Catechin Equivalents
DPPH	: 2,2-diphenyl-1-picrylhydrazyl
et al	: And other
FAO	: Food and Agriculture Organization
FEV	: Flow Expiratory Volume
Fig	: Figure
GAE	: Gallic Acid Equivalent
H ₂ O ₂	: Hydrogen Peroxide
HPLC	: High Performance Liquid Chromatography
L	: Litter
μ g	: Microgram
mg	: mill gram
ml	: Milliliter
NS	: Non Significant
O.D	: Optical Density
ORAC	: Oxygen Radical Absorbance Capacity
PPs	: Polyphenols
TPAC	: Total Phenolic Acid Contents
TPC	: Total Phenolic Contents