

PRODUCTION AND EVALUATION OF SOME LOW CALORIE NATURAL SWEETENERS AS SUBSTITUTES FOR SUCROSE

By

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B. Sc. Agric. Sc. (Food Technology), Ain Shams University, 2004

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إنتاج وتقييم بعض المحليات الطبيعية منخفضة السعرات الحرارية كبدائل للسكر

رسالة مقدمة من

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للحصول على
درجة الماجستير في العلوم الزراعية
(علوم وتكنولوجيا الأغذية)

قسم علوم الأغذية
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صفحة الموافقة على الرسالة

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ABSTRACT

Safaa Sayied Abozed Ahmad: Production and Evaluation of Some Low Calorie Natural Sweeteners as Substitutes for Sucrose. Unpublished M.Sc. Dissertation, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2010.

The current study was designed to produce low caloric sweeteners from natural sources such as stevia leaves (*Stevia rebaudiana* Bertoni) and Jerusalem artichoke (*Helianthus tuberosus* L.). Per cent nutrients composition of stevia were found to be impressive with of 13.94 g of protein, ash at 12.42 g and crude fiber at 11.28 g. Minerals composition indicated that presence of fairly good amount of calcium 429.4 mg, iron 57.3 mg and sodium 46.2 mg. Stevioside, which is the main sweet component in the leaves, the optimal conditions for maximum stevioside extraction yield were 7.58, 7.45 and 6.52 % in methanol, water and water after soaking in chloroform extraction, respectively. The successful trial for purification of syrup was using natural alumina oxide column for obtaining pure stevioside sweeteners free of pigments or colored constituents and other water-soluble components. As for organoleptic evaluation of stevia sweeteners syrup, data indicated that the stevia sweeteners syrup produced by water extraction after soaking in chloroform was the best treatment in sweet taste without bitter aftertaste and over all acceptability, while the relative sweetness of this syrup was 250 times sweeter than sucrose. Jerusalem artichoke has been reported to have one of the highest carbohydrates yield. The main carbohydrate component in Jerusalem artichoke tubers is inulin, with high fructose content (about 94 %). The optimal conditions for maximum inulin extraction yield were (68.71 %) at 85 °C, 60 min and water solid ratios 1:20 (v/w). Precipitation of inulin using four

different solvents (ethanol, propanol, acetone and acetonitrile) at different ratios of 1:1, 2:1, 3:1 and 4:1 (solvent: supernatant v/v) were studied. Inulin precipitation by ethanol and acetone were more than that occurred using acetonitrile or propanol. The influence of pH, type of acid, temperature and time on hydrolysis of inulin were investigated. The complete hydrolysis of inulin was attained at pH 2.0, adjusted with sulphuric acid after 90 min at 100 °C. Then sweeter syrup produced from acid hydrolysis of inulin was clarified and concentrated to 78.4 % total soluble solids by evaporation to produce high fructose syrup. As for application of these sweeteners for the production of cake, the optimum results were achieved using fructose or stevioside combination with sucrose and could be recommended that sucrose could be replaced by stevia sweeteners at 100 % to produce low calorie cakes.

Key words:

Natural sweeteners, *Stevia rebaudiana*, Extraction and purification, Stevioside, *Helianthus tuberosus*, Inulin, Acid hydrolysis, High fructose syrup.

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CONTENTS

	Page
LIST OF TABLES	V
LIST OF FIGURES	VIII
LIST OF ABBREVIATIONS	XI
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	5
2.1. Natural and synthetic sweeteners	5
2.2. Stevioside	9
2.2.1. Stevia as natural source	9
2.2.2. Extraction and purification of stevioside	14
2.2.3. Pharmacology and toxicology of stevioside	17
2.2.4. The technology application of stevia sweeteners	19
2.3. Jerusalem artichoke	22
2.3.1. Agronomy classification	22
2.3.2. Effect of storage condition on chemical characteristics of Jerusalem artichoke	24
2.3.3. Sources and functional properties of inulin	26
2.3.4. Extraction of inulin	34
2.3.5. Production of high fructose syrup from inulin	37
2.3.5.1. Acid hydrolysis	38
2.3.5.2. Enzymatic hydrolysis	39
2.3.6. Properties of fructose syrup	41
2.3.7. Technology application of fructose syrup	42
3. MATERIALS AND METHODS	45
3.1. MATERIALS	45
3.1.1. Dried Stevia Leaves	45
3.1.2. Jerusalem Artichoke Tubers	45
3.1.3. Preparation of Samples	45
3.2. METHODS	45
3.2.1 Chemical proximate composition of stevia leaves and Jerusalem	45

II

artichoke tubers	
3.2.2 Total carbohydrates	46
3.2.3 Minerals	46
3.2.4 Stevia leaves	46
3.2.4.1 Determination of stevioside content	46
3.2.4.2 Determination of total chlorophylls and carotenoids	46
3.2.4.3 Extraction of stevioside	47
3.2.4.3.1 Extraction with water	47
3.2.4.3.2 Extraction with methanol	47
3.2.4.4 Hunter colour evaluation	48
3.2.4.5 Purification and production of stevioside syrups	48
3.2.4.6 Chemical and physical characteristics of syrups	49
3.2.4.7 Sensory evaluation of stevioside syrups	49
3.2.4.8 Sweetness intensity evaluation	50
3.2.4.9 Determination of total glycoside by HPLC	50
3.2.4.10 Production of stevioside crystals	51
3.2.4.11 Thin layer chromatographic of stevioside sweeteners	51
3.2.5. Jerusalem artichoke tubers	54
3.2.5.1. Storage condition	54
3.2.5.2. Drying methods	54
3.2.5.3. Extraction of inulin from Jerusalem artichoke tubers	54
3.2.5.4 Determination of inulin content	54
3.2.5.4.1 Colorimetric methods by resorcinol	54
3.2.5.4.2 Titration with potassium permanganate	55
3.2.5.4.3 inulin content was calculated by using the equation	56
3.2.5.5. Isolation and precipitation of inulin	56
3.2.5.6. Chemical and physical properties of inulin	57
3.2.5.7. Production of high fructose syrup by acid hydrolysis of inulin	57
3.2.5.8 Physical and chemical characteristics high fructose syrup	58
3.2.6. Chemical structure study	60

III

3.2.6.1. Infrared spectroscopy	60
3.2.6.2 Electronic microscopy	60
3.2.7. Application technology of sweeteners	60
3.2.7.1. Application of stevia leaves in tea	60
3.2.7.2. Carrot cake preparation	61
3.2.7.2.1 Physical properties of cake	61
3.2.7.2.2. color measurement by Hunter	62
3.2.7.2.3. Organoleptic evaluation	62
3.2.8. Statistical analysis	64
4. RESULTS AND DISCUSSION	65
4.1. Stevia leaves	65
4.1.1. Chemical composition of stevia leaves	65
4.1.2. Extraction of stevioside	66
4.1.2.1. Extraction by hot water	66
4.1.2.2. Extraction by methanol	68
4.1.3. Effect of solvent soaking on steviosoid content	72
4.1.4. Effect of soaking treatments and extraction on chlorophyll and carotenoids pigments in stevia leaves	74
4.1.5. Hunter color evaluation of different extract	78
4.1.6 Purification of stevia sweeteners syrup	82
4.1.7. Physical and chemical properties of stevia sweeteners	82
4.1.7.1. Physical properties	82
4.1.7.2. Chemical properties	84
4.1.8. Sensory evaluation of stevioside sweeteners	86
4.1.9. Sweetness intensity evaluation	89
4.1.10. stevioside crystals preparation	89
4.1.11. Electronic Microscopy of stevioside crystals	90
4.1.12. Infrared spectroscopy	91
4.2. Jerusalem Artichoke Tubers	94
4.2.1. Effect of drying methods on proximate composition of Jerusalem artichoke tubers	94

IV

4.2.2. Minerals Content of Jerusalem artichoke tubers	96
4.2.3. Effect of storage temperature on Jerusalem artichoke tuber composition	96
4.2.4. Effect of using different solid/water ratios and extraction periods on the inulin yield at different temperatures	107
4.2.4.1. Effect of different solid/water ratios and extraction periods at 65 °C on the inulin yield	107
4.2.4.2. Effect of using different solid/ water ratios and extraction periods (min) at 75 °C on the extraction yield of inulin	110
4.2.4.3. Effect of using different solid/ water ratios and extraction periods at 85 °C on the yield of inulin	113
4.2.4.4. Effect of using different solid/ water ratios and extraction periods at 95 °C on the extraction yield of inulin	116
4.2.5. Inulin precipitate	120
4.2.6. Chemical proximate composition of precipitated inulin	121
4.2.7. The solubility of inulin	124
4.2.8. Electronic microscopy of inulin powder	126
4.2.9. Infrared spectroscopy of inulin	126
4.2.10. High fructose syrup production using acid hydrolysis	129
4.2.11. Physical and chemical properties of high fructose syrup	133
4.3. Application Technology of sweeteners	137
4.3.1. Utilization of stevia leaves in preparation of hot tea	137
4.3.2. Utilized of stevioside and fructose syrup in carrot cake	139
4.3.2.1. Organoleptic evaluation	139
4.3.2.2. Hunter color measurement	141
4.3.2.3. Physical properties of produced cakes	146
5. SUMMARY	149
6. REFERENCES	158
ARABIC SUMMARY	

LIST OF TABLES

No.	Title	Page
1	Natural and synthetic sweeteners	8
2	Food use levels of steviol glycoside sweeteners (mg/ Kg)	21
3	Fructan compounds structure and origin	27
4	Inulin content and chain length in different food stuffs	28
5	Proximate chemical composition of stevia leaves (g/100g on dry weight basis %)	65
6	Mean values of stevioside (%) extracted from stevia leaves by hot water (60-65 °C) after soaking in chloroform or hexane.	67
7	Mean values of stevioside (%) extracted from stevia leaves by methanol after soaking in chloroform or hexane	70
8	Effect of solvent soaking on the steviosoid content in extract and leaves	73
9	Effect of soaking treatments during the extraction of stevioside from stevia leaves on total pigments content (mg / 100g)	76
10	Color index of different stevia extracts at different treatments	80
11	Physical and chemical properties of stevia sweeteners syrup produced by different conditions	85
12	Sensory evaluation of the stevia sweeteners syrup produced using different conditions during extraction	87
13	Wave numbers (cm ⁻¹) and level of absorption of the infrared spectrum of the tested stevioside sample	92
14	Proximate chemical composition of fresh and dried Jerusalem artichoke tubers (g/100g dry weigh basis)	95
15	Minerals content of Jerusalem artichoke tubers (mg/100g dry basis)	96
16	Effect of storage conditions on some chemical constituents of Jerusalem artichoke tuber stored for 2 weeks	98
17	Effect of storage conditions on some chemical constituents of	100