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 للسكروز

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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 Unpublished M.Sc.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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