PHYSICOCHEMICAL PROPERTIES OF THE OIL FROM MURUMURUÍ FRUIT (ASTROCARYUM ACAULE): REASON W-6/W-3 AND W-9 POTENCIAL

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Resumo

Astrocaryum acaule (Arecaceae), popularly known as murumuruí or tucumanzinho. This species can be found in higher concentrations in the Amazon region, usually in flooded areas. Our objectives were characterized the physicochemical properties of the vegetable oil obtained from fruit of pulp of the A. acaule by nuclear magnetic resonance of hydrogen (1H NMR) and check your fatty acid profile by gas chromatography coupled to flame ionization detector, GC /FID. The oil was obtained by using Soxhlet and as the solvent, hexane. Chemical shifts were provided by 200 MHz 1H NMR, Bruker Avance DPX 200, and its integral calculated by the SpinWorks 4.2.0 program and were added to PROTOLEOS II software developed by Oleochemicals group to obtain the physicochemical properties and the fatty acid profile

Palavras chaves

fatty acids; Amazon; Arecaceae

Introdução

The Astrocaryum (Arecaceae) genre is composed of 40 species distributed in 12 countries. In South America, Brazil stands out with a total of 26 species, namely: Astrocaryum acaule, A. aculeatum, A. aculeatissimum, A. arenarium, A. campestre, A. chambira, A. echinatum, A. faranae, A. farinosum, A. ferrugineum, A.giganteum, A. gynacanthum, A. huaimi, A. jauari, A. javarense, A. kewense, A. minus, A. murumuru, A. paramaca, A. pygmaeum, A. rodriguesii, A. sociale, A. sciophilum, A.ulei, A. vulgare, and A. weddellii (KAHN, 2008). Mambrim et al.(1997) describe some species of murumuru as a small palm (3-6 m), when compared to others of the same family (Arecaceae). Also according to the author the pulp is highly valued by the Amazonian population. Besides food, Bacelar-Lima et al. (2006) note the usefulness of its fibers from the leaves in the production of handicrafts, such as nets, ropes and arches. Thus, Pacheco et al. (2011) develop semi-industrial products from A. acaule (murumuruí or tucumanzinho) as fiber with added value. But, information on chemical and physico-chemical studies in A. acaule lipids are incipient. For this reason, the aims of this study were to verify the fatty acids in A. acaule lipids by GC-FID and the physicochemical properties of this lipids by 1H NMR.

Material e métodos

Obtaining Muruuruí fruit and extacting lipids from pulp Murumuruí samples were collected in the municipality of Caracaraí, at kilometer national highway 174, in the community of Cujubim in Boa Vista, Roraima. Samples were taken to the Laboratory of Environmental Chemistry at the Center for Research and Post-Graduação of Science and Technology of the Federal University of Roraima, Boa Vista, Roraima. The pulp was removed from the fruit and dried for 24 hours at 50 °C in an oven with air circulation. The dried sample was milled and homogenized in bins of 20-40 Mesh. Lipids extraction gave Soxhlet solvent n- hexane (Merck 99%), carrying out any procedure in triplicate. Chemical composition of GC/MS Was dissolved in 2.0 mL cryogenic tube approximately 12 mg of sample oil in 100 L of a solution of ethanol (95%) / Potassium hydroxide 1 mol.L-1 (5%). After vortexing for 10 s, oil was hydrolyzed in domestic microwave oven (Panasonic Piccolo), a power of 80 W for 5 min. After cooling, 400 mL of hydrochloric acid 20% was added a spatula tip of NaCl (approximately 20 mg) and 600 mL of ethyl acetate. After vortexing for 10 s rest for 5 min. An aliquot of 300 mL of the organic layer was removed, placed into microcentrifuge tubes, dried by evaporation, thus obtaining free fatty acids (Christie, 1989). Subsequently, the free fatty acids were methylated with 100 µL of BF3 / methanol (14%), by heating for 10 min in water bath at 60 oC. These samples were diluted in 400 mL of methanol and analyzed by gas chromatography. The analyzes were performed on a HP- 7820A chromatograph (Agilent equipped with a gas flame ionization detector . As data acquisition program was used EZChrom Elite Compact (Agilent) . HP-INNOWax column 15m x 0.25 mm x 0.20 microns with temperature gradient was used : 120 °C, 0 min 7 °C/min to 240 °C ; injector (Split 1/50) detector at 250 °C and 260 °C. Hydrogen was used as carrier gas (3.0 mL/min) and injection volume of 1 µL. Identification of the peaks was performed by comparison with standards of methylated fatty acids C14-C22 FAME (Supelco cat no 18917) (Christie, 1989). Determination of physical and chemical properties from 1H-RMN spectrum The 1H NMR spectra were recorded on a Bruker model Avance 200 DPX spectrometer operating at 4.7 Tesla , corresponding to a resonance frequency of 200.13 MHz for 1H cores, equipped with a direct detection head four cores probe and field gradients in the z axis. The samples were analyzed in 5 mm NMR tube (Wilmad 507). The NMR samples were prepared by dissolving 0.5 mL of the oil in 0.5 mL of CDCl3. Chemical shifts are given in ppm using TMS as internal standard. Typical parameters for 1H NMR spectra were: 30° pulse, 8s acquisition time, 6.4 kHz spectral window, 16 scans, 52 K data points. The physical and chemical properties murumuruí oil were determined com PROTÓLEOS computer program.

Resultado e discussão

Fatty acids in A. acaule Lipid The GC-FID provided a total of 10 different fatty acids were determined, as shown below in the chromatogram of Figure 1 and in Table 1, the various fatty acids in the A. acaule lipid are collected with the percentage in the appearing and retention times. GC analysis shows 77.66% of unsaturated fatty acids facing a 2.91% saturated. Between the unsaturated fatty, It stands out as a major, acids oleic acid with 74.05%. This value is higher than other Amazonian palm pulps as bacaba (57.1%) or tucumã (64.1%), but slightly lower than that patuá pulp (77.7%) (Mambrin et at., 1997). The presence of this acid is beneficial for the body because it helps reduce the risk of cardiovascular disease (Funari et al., 2003). Moreover, saturated fatty acids show 19.43% from murumuruí oil, among them palmitic acid with 14.50%. This amount is lower than those found in other Amazonian oils as bacaba (46.2 %), burití (71.6%), inajá (39.2 %) or pupunha (46.2 %) de acuerdo con (Santos et al., 2013). As to the reason obtained from the omega 6:omega-3 is 3.31 so this relationship is to be found in no more than 5.0 values, and if it exceeds those values recommended not generate a good profit for cardiovascular health and overrides benefits of omega 3 fatty acids (Sánchez-Benito, 2011). The remaining 2.91% corresponds to other fatty acids present in the sample in trace amounts, because they are detectable in the conditions in which we have operated. Physicochemical proprieties by RMN-1H Notably from the PROTÓLEOS using the program, they were determined the physicochemical Properties. See murumuruí oil whose values are presented. PHYSICOCHEMICAL PROPERTIES VALUES Iodine content (gI2/100 g) 72.10 Acidity content (mg KOH/g) 0.21 Saponification content (mg KOH/g) 173.58 Esterification content (mg KOH/g) 99.88 The first parameter is iodine value, whose value indicates the degree of unsaturation of the oil and fats. In this case, the value obtained is 72.10 gI2/100 g. The saponification number indicates the average molecular weight of fatty acids that give esterification reaction with glycerol to form triacylglycerol molecule, so if you have an index value high saponification means that we in the acid sample low molecular weight fatty. The value obtained is slightly lower than those obtained for the palm according to the values presented by Jorge et al. (2012), range from (190-209 mg.KOH/g). The low value of the acid value (0.21 mg KOH/g) for A. acaule lipid indicates that although not refined oil is well maintained.

Fatty acids in A. acaule lipid

FATTY ACID	COMPOSITION	RETENCION TIME (min)	%
Caprid acid	C 10:0	0,761	---
Laurid acid	C 12:0	1,563	0,20
Myristic acid	C 14:0	2,862	0,15
Pentadecyl acid	C 15:0	3,735	---
Palmitic acid	C 16:0	4,742	14,50
Palmitoleic acid	C 16:1	4,903	0,29
Estearic acid	C 18:0	6,867	4,32
Oleic acid	C 18:1	7,071	74,05
Linoleic acid	C 18:2	7,562	2,55
Linolenic acid	C 18:3	8,197	0,77
Araquic acid	C 20:0	8,977	0,26
TOTAL ACID	---	---	97,09
UFA[1]	---	---	77,66
UFA[2]	---	---	19,43
Other	---	---	2,91

UFA[1] Unsatured fatty acids. UFA[2] satured fatty acids.

Conclusões

The fresh consumption of the Amazon species A. acaule can bring many benefits, because its lipids carry a large quantity of oleic acid, can prevent diseases of the cardiovascular system. The good results of the physicochemical properties suggest that besides the feeding can apply the lipid as a raw material for pharmaceutical and cosmetics industries.

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