EVALUATION OF THE BIOLOGICAL POTENTIAL OF AMAZONIA EXOTIC OILS BEFORE AND AFTER ENZYMATIC INTERESTERIFICATION PROCESS FOR THE PRODUCTION OF NEW OILS

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Samples		Tocopherol fractions (µg/g)				Total phenolics (µg/g Eq galic acid)	Total carotenoids (µg/g)	DPPH (IC50)	ORAC (µmol Trolox/g oil)
		a	b	g	y				
Original oils	Patatuá	--	--	--	--	10.75 ± 0.72	--	49.97	68.71
	Buriti	112.50 ± 3.91	7.13 ± 0.01	107.40 ± 3.43	9.38 ± 0.54	107.00 ± 1.25	510.37 ± 0.68	81.06	100.34
Mixed Oils	Patauá: Palm estearin (7:3)	--	--	--	--	55.33 ± 0.48	--	61.40	52.80
	Buriti: Murumuru (7:3)	74.64 ± 0.73	1.90 ± 0.16	50.11 ± 0.34	8.26 ± 0.24	52.42 ± 0.64	405.98 ± 1.35	80.50	70.71
Interesterified oils (TL-IM Novozyme)	Patauá: Palm estearin (7:3)	--	--	--	--	10.75 ± 5.05	--	58.30	57.71
	Buriti: Murumuru (7:3)	76.01 ± 4.10	0.31 ± 0.43	69.06 ± 3.95	3.51 ± 0.10	85.33 ± 1.58	364.81 ± 2.71	86.39	94.65
Interesterified oils (Rhizopus sp.)	Patauá: Palm estearin (7:3)	--	--	--	--	25.33 ± 1.34	--	47.15	102.42
	Buriti: Murumuru (7:3)	69.24 ± 2.98	--	63.26 ± 2.75	2.85 ± 0.39	70.33 ± 0.24	429.44 ± 11.5	73.28	110.99

Table 1. Minor components characterization and antioxidant capacity (in vitro) of the oil samples: Patatuá (Oenocarpus bataua Mart.), Buriti (Mauritia flexuosa Mart.), Palm estearin (Elaeis Guineensis Jacq), Murumuru (Astrocaryum murumuru Mart.)

The Amazonian flora is extremely rich and diverse in oilseeds, being unique and incomparable. The Amazon oils have a great potential to apply in cosmetics, drugs and functional foods and has huge unexplored nutritional and biological potential. Apart from natural oils, the fatty bases production, with better physical-chemical properties to industrial application, high nutritional and biological potential, is an eminent need. Enzymatic interesterification, involving the rearrangement of fatty acids among glycerol backbones, is proving to be a good alternative.The change in the original triacylglycerol composition modified the physical and biological properties of restructured triacylglycerol, thus increasing the potential applications of these lipids. However, goal of this project was to evaluate the nutraceutical potential of these new generated oils, based on Amazon oils and biotechnological process. For that, the antioxidant capacity of selected Amazon oils and the new oils generated by enzymatic interesterification were evaluated by *in vitro* e *ex vivo* methods. The interesterification reactions were carried out by two different lipases, first, the commercial NOVOZYME lipases (TL-IM), and, second, the lipases produced by wild fungus strain of *Rizhopus sp*., isolated by the research group in previously projects. The Amazon fats chosen for this study were Buriti oil, known for its antioxidant capacity, and Murumuru fat. The results obtained of region specific distribution of fatty acids on triacylglycerol and its technological properties modifications are shown as results of another project financed by FAPESP (2012 22774-5), briefly, the analyzes indicate the production of an oil rich in unsaturated fatty acids at the positions sn-1,3. The production of lipids with high content of unsaturated fatty acids in the position sn-1,3 of triglyceride and free of trans fatty acids is of great interest for the development of lipids with high nutritional and biological potential.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

In addition to the potential healthy improvement of the fat acids composition on the new oils, our interest was also to evaluate if the high antioxidant potential of the Buriti oil, due to its minor components as tocopherols and phenolic compounds, was preserved. For that, this project evaluated these minor components composition on the original and new oils; tested the antioxidant capacity of the samples against the DPPH (2,2-diphenyl-1-picryl-hidrazyl-hidrate) and ORAC free radicals. At the present moment, the team is heading to the second half of the project development, testing the range of the samples concentrations adequate for the human hepatocytes antioxidant assays. The proposed cells assays mean to evaluate the capacity of the samples in modulate the endogenous antioxidant enzymes activity, for the detoxification of tissues highly metabolic active as the liver. The enzymatic activity of intracellular catalase, superoxide dismutase and glutathione peroxidase will be evaluated in human hepatocytes culture cells (Hep G2), before and after the treatment with the oils. The results obtained, so far, are shown on *Table 1*. These partial results indicate that the oils generated by enzymatic interesterification from the Buriti oil and Murumuru fat – highlighting the process catalysed by lipase from *Rhizopus sp.* – are promising with respect to their biological activity. The results of free radicals scavenging potential, assessed by DPPH and ORAC assays, are closely linked to minor components of the oils with high antioxidant potential, such as the tocopherols, phenolics, and carotenoids. Moreover, the tests involving modulation of endogenous antioxidant enzymes activity, may be influenced by both the minor compounds of oils and their triglycerides and fatty acids composition. For this reason, the healthy potential of the new generated oils may be more evident after the following steps of this work.

Figure 2. Ilustrations of Murumuru, Buriti, Patauá and Palm fruits, from the higher to the lowest picture, respectively

MAIN PUBLICATIONS

Falcão A, Speranza P, Macedo GA, Macedo JA. 2013. Antioxidant capacity of Amazon oils before and after enzymatic interesterification. Proceedings of 5éme Symposium Nutrition, Biologie de l'Oxygene et Medicine. Paris, Fr. P. 37.

Falcão A, Speranza P, Macedo GA, Macedo JA. 2013. Effect of enzymatic interesterification on the antioxidant capacity of Amazon oils. Proceedings of 10° Simpósio Latino Americano de Ciências de Alimentos. Campinas, Brasil. CD ROM.

Speranza P, Ribeiro AP, Macedo JA, Macedo GA. 2013. Effect of enzymatic interesterification on nutrional and biological properties of oils from Amazonia area. Proceedings of 10° Simpósio Latino Americano de Ciências de Alimentos. Campinas, Brasil. CD ROM.

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