Científic@
Multidisciplinary Journal
e-ISSN 2358-260X

PHYSICAL PROPERTIES OF OENOCARPUS BACABA BEFORE AND AFTER DRYING IN THE BRAZILIAN AMAZON REGION

PROPRIEDADES FÍSICAS DA OENOCARPUS BACABA ANTES E APÓS A SECAGEM NA REGIÃO AMAZÔNICA BRASILEIRA

Ellen Rye Kuroke Gonçalves[1], Larissa Mendes Da Costa[2], Rafaela Ferreira Carvalho[3], Arlindo Modesto Antunes [4]

[1]Graduate student, Universidade Federal Rural da Amazônia –UFRA campus Tomé-Açu, Rodovia PA- 451, km-03, Bairro Açaizal, CEP: 68.680-000, Tomé-Açu – Pará, Brazil, e-mail: kurokegonçalves@gmail.com
[2]Graduate student, Universidade Federal Rural da Amazônia –UFRA campus Tomé-Açu, Rodovia PA- 451, km-03, Bairro Açaizal, CEP: 68.680-000, Tomé-Açu – Pará, Brazil, e-mail: larissacosta167@gmail.com
[3]Graduate student, Universidade Federal Rural da Amazônia –UFRA campus Tomé-Açu, Rodovia PA- 451, km-03, Bairro Açaizal, CEP: 68.680-000, Tomé-Açu – Pará, Brazil, e-mail: rafacarvalho724@gmail.com
[4] PhD Professor of the Agricultural Engineering course, Federal Rural University of the Amazon –UFRA, Rodovia PA- 451, km-03, Bairro Açaizal, CEP: 68.680-000, Tomé-Açu – Pará, Brazil, e-mail: arlindo.antunes @ufra.edu.br

Info
Received: 07/2023
Published: 11/2023DOI: 10.37951/2358-260X.2024v11i1.6829
ISSN: 2358-260X
Palavras-Chave
OENOCARPUS BACABA , Amazonia
Keywords:
OENOCARPUS BACABA , Amazonia

Resumo

No estado do Pará as palmeiras de frutos exóticos açaí (Euterpe oleracea) e bacaba (*Oenocarpus bacaba* Mart) presentes no bioma da Amazônia e Cerrado, o maior produtor e consumidor de polpa de bacaba e seus derivados é o estado do Pará. o objetivo deste trabalho é determinar o teor de água, massa específica e o ângulo de repouso do caroço da bacaba. O estudo foi desenvolvido no laboratório de engenharia agrícola, na Universidade Federal Rural da Amazônia-UFRA, Campus Tomé-Açu, foram determinadas as seguintes propriedades físicas: teor de água, massa específica e ângulo de repouso antes e após a secagem. Concluiu-se que o material analisado apresentou diferentes propriedades físicas antes e após a secagem e apresenta um ângulo de boa fluidez.

Abstract

In the state of Pará, the exotic fruit palm trees açaí (Euterpe oleracea) and bacaba (Oenocarpus bacaba Mart) are present in the Amazon and Cerrado biomes, and the largest producer and consumer of bacaba pulp and its derivatives is the state of Pará. The objective of this work is to determine the water content, specific mass and angle of repose of bacaba seeds. The study was developed in the agricultural engineering laboratory at the Federal Rural University of Amazônia-UFRA, Campus Tomé-Açu, and the following physical properties were determined: water content, specific mass and breathing angle before and after drying. It was concluded that the analyzed material presented different physical properties before and after drying and presented a good fluidity angle.

INTRODUCTION

In the state of Pará, the exotic fruit palm trees açaí (*Euterpe oleracea*) and bacaba (*Oenocarpus bacaba Mart*) present in the Amazon and Cerrado biomes are of paramount importance for the regional population in their diet, especially for riverside dwellers, as they present sources of vitamins, minerals, and fiber and have high antioxidant activity (BARROS et al., 2021). These nutrients are present in the pulp and other involved parts of the fruit that are often discarded (SCHIASSI et al, 2018; SAMPAIO et al, 2020).

Bacabeira reaches 7 to 22 meters in height and has regularly distributed pinnate compound leaves between 6 and 8 meters in length, yellowish-white flowers, clustered fruits, and black–purple subglobose drupes with very oily mucilaginous pulp (GUIMARÃES, 2013). It is produced once a year and usually has 1 to 3 bunches, weighing up to 20 kg of fruit. A prolific palm tree can produce twice as many fruits. However, its bunches flower 5 to 6 times more than açaí, which compensates for production (SHANLEY et al., 2005).

The pulp is extracted from bacabeira fruits and consumed as wine, jelly, ice cream and juices (FINCO et al., 2010). The pulp and heart of palm have the greatest economic potential, as edible oils are extracted, similar to olive oil, where this oil has medicinal properties used for bronchitis and tuberculosis (EMBRAPA, 2005). It is noteworthy that biodiesel is also produced from bacaba seeds (SANTOS and MARINS, 2021).

The largest producer and consumer of bacaba pulp and its derivatives is the state of Pará. The natural population of the species is referred to in the state of origin of all fruit production, and extractive activities still occur (IBGE, 2018). According to the latest estimates (2017) published by IBGE, national bacaba production reached 3,729 tons, of which Pará accounted for 1,469 tons or 39.4% of total production, a value that grows year after year. Recent data show that at harvest time, 14 kg cans of fruit cost up to 30.00 reais and 15.00 reais per liter of processed pulp (IMAZON, 2023), generating income for the local economy, which can be expanded by increasing the value of cellulose byproducts (Homma, 2014).

The consumption of this food has become a substitute for the end consumer, who tends to look for alternatives due to the lack or high price of açaí. Despite being a product widely used in the Amazon region, little research has been done on its physical-chemical properties. In this way, the research by Neves et al. (2015) and Seixas et al. (2016) portrayed the quality of bacaba as a moderately acidic food, with high levels of fiber and lipids.

Like the pulp, the bacaba seed is an important parameter for understanding the physical properties of the fruit, consequently adding value to the product and its derivatives. However, the lack of studies regarding bacaba seeds encourages research into its use. Therefore, the objective of this work is to determine the water content, specific mass and angle of repose of bacaba seeds.

MATERIALS AND METHODS

The study was developed in the agricultural engineering laboratory at the Federal Rural University of the Amazon-UFRA, Campus Tomé-Açu.

The bacaba seeds (Figure 1) were collected from açai sales establishments in the study municipality, and approximately 3.523 kg of bacaba seeds were used. The following physical properties were determined: water content, specific mass and angle of repose before and after drying.

Figure 1 – Bacaba pits collected

To determine the water content, three containers were separated using the oven method, with samples of 50 g of seeds. Then, the samples were stored in the oven for 24 h at 105 °C and weighed again to obtain the final water content values.

The specific mass of a product is obtained by equation 1.

Equation 1

$$\rho = \frac{m}{v}$$

On what:

ρ- specific mass (g.cm-3);

m - is the mass of grains (g) and

v - volume of the container (cm3).

The methodology was carried out with the aid of a precision scale to obtain the mass of the bacaba seed stored in a container with a known volume. After obtaining the results above, the total material was thrown into the angle of repose meter. The angle formed between the top and base of the meter was determined to obtain its angle of repose.

To carry out the method after drying, the total volume material was separated into three samples and exposed to the oven for 9:30 h at a temperature of 40 °C, reaching a total weight of 2.545 kg, immediately after repeating the procedures for obtaining the water content, specific mass and angle of repose.

RESULTS AND DISCUSSION

The results of water content, specific gravity and angle of repose before and after drying, obtained for bacaba seeds, are presented in Table 1.

TABLE 1 – Average values of water content, specific mass, and angle of repose for bacaba seed samples.

	Water content (bu)	Specific mass (g.cm3)	angle of repose
Before drying	36,053	0.636	30°
After drying	32,686	0.734	30°

The water content is fundamental for evaluating the quality and storage of the grain. Table 1 shows that the water content data of the bacaba seed does not tolerate water loss, thus losing its viability after processing. According to José et al. (2012), seeds with 26% water content are unable to germinate; therefore, it is relevant to note that their seed is from a species with recalcitrant behavior.

Analyzing the values presented in Table 1, it is observed that the specific mass decreases with the increase in the moisture content of the product, and a result compared to Tavakoli et al. (2009) observed an increase in specific mass values due to the reduction in water content.

The angle of repose is useful for obtaining information about the fluidity of solids (BHANDARI et al., 1998); that is, a greater angle of repose indicates lower mobility. Shittu, Lawal (2007) added more categories to this classification by stating that granular solids with angles of repose up to 35° have good fluidity, 35° to 45° are weakly cohesive, 45 to 55° are cohesive and above 55° are very cohesive.

CONCLUSION

It was concluded that the analyzed material presented different physical properties before and after drying and had a good fluidity angle.

REFERENCES

Barros, S. K. A.; Souza, A. R. M.; Damiani, C.; Pereira, A. S.; Alves, D. G.; Clemente, R. C.; Costa, D. M. Obtenção e caracterização de farinhas de caroço de açaí (Euterper Oleracea) e de casca de bacaba (Oenocarpus Bacaba). **Research, Society and Development**, v. 10, n. 4, p. e2710413724-e2710413724, 2021.

BHANDARI, B. R.; Datta, N.; D'Arcy, B. R., Rintoul; G. B.o-crystallization of honey with sucrose. **Lebensmittel Wissenschaft-Und-Technologie**, v. 31, n. 2, p. 198-142, 1998.

Disponivel>https://www.infoteca.cnptia.embrapa.br/infoteca/bitstream/doc/859494/1/folderbacaca.pdf<. Acesso em 04 de abril de 2023

FINCO, F. D. B. A. KAMMERER, D. R.; CARLE, R.; TSENG, W.H. Atividade antioxidante e caracterização de compostos fenólicos do fruto da bacaba (Oenocarpus bacaba Mart.) por HPLC-DAD-MS. **Journal of Agricultural and Food Chemistry** , v. 60, n. 31, pág. 7665-7673, 2012.

GUIMARÃES, A. C. G. Potencial funcional e nutricional de farinhas de Jerivá (Syagrus romanzoffiana) e Bacaba (Oenocarpus bacaba). 2013. 115f. Dissertação (Mestrado em Ciência dos Alimentos) – Universidade Federal de Lavras, Lavras, 2013.

Homma, A. K. (2014) O. Extrativismo Vegetal na Amazônia: História, Ecologia, Economia e Domesticação. Embrapa Amazônia Oriental-Livro Científico (Alice).

IBGE - Censo Agropecuário 2017, In: Sidra- Sidra De Recuperação Automática. Rio De Janeiro, 2010. Https://Sidra.Ibge.Gov.Br/Tabela/6617.

IMAZON. Preços De Produtos Da Floresta. Disponível em: Https://Drive.Google.Com/Drive/Folders/1heh-Xhhml6ppurwg21kpdopzfzies3-L. Acesso em: 3 Jan De 2022.

José, A.C.; Erasmo, E.A.L.; Coutinho, A.B. Germinação e tolerância à dessecação de sementes de bacaba (Oenocarpus bacaba Mart.). **Revista Brasileira de Sementes**, 34: 651-657, 2012.

NEVES, L. T. B. C. CAMPOS, D. C. D. S.; MENDES, J. K. S.; URNHANI, C. O.; ARAÚJO, K. G. Quality of fruits manually processed of açaí (Euterpe oleracea mart.) and bacaba (Oenocarpus bacaba mart.). Revista Brasileira de Fruticultura. v. 37, n.3, p. 729-738, 2015.

SAMPAIO, P. B. R.; PEREIRA, A. S.; PIRES, C. R. F.; CLEMENTE, R. C.; NASCIMENTO, G. N. L. Otimização do processo de extração de antioxidantes presentes na bacaba (oenocarpus distichus mart) utilizando metodologia de superfície de resposta Optimization of the antioxidants extraction process from the bacaba (oenocarpus distichus mart.) using response surface methodology Optimización del proceso de extracción antioxidante presente en bacaba (oenocarpus. **Research, Society and Development**, v. 9, n. 8, p. e229985427, 2020.

SANTOS, J.; MARTINS, V. L. Produção e Otimização do Biodiesel de óleo de bacaba (Oenocarpus bacaba Mart.). **Revista Multidisciplinar de Educação e Meio Ambiente**, v. 2, n. 4, p. 1-8, 2021

SCHIASSI, M. C. E. V.; SOUZA, V. R.; LAGO, A. M. T.; CAMPOS, L. G.; QUEIROZ, F. Fruits from the Brazilian Cerrado region: Physico-chemical characterization, bioactive compounds, antioxidant activities, and sensory evaluation. **Food chemistry**, v. 245, p. 305-311, 2018.

SEIXAS, F. R. F.; SESQUIM, E. A. R.; RAASCH, G. S. CINTRA, D. E. Physicochemical characteristics and lipid profile of the bacaba occurring in the western Amazon. **Brazilian Journal of Food Research**. v. 7, n.3, p. 105-116, 2016.

SHANLEY, P.; MEDINA, G.; CORDEIRO, S.; SILVA, A.V.; GUNN, B.; IMBIRIBA, M.; STRYMPL, F.; SUNGKOWO, D.; VERÍSSIMO, T.C.; GUTEMBERG, I.; VERÍSSIMO J.; PRAJANTHI, W. Frutíferas e plantas úteis na vida amazônica, Belém: CIFOR, Imazon, 183- 186, 2005.

SHITTU, T. A.; LAWAL, M. O. Factors affecting instant properties of powdered cocoa beverages. **Food Chemistry**, v. 100, n. 1, p. 91-98, 2007.

Tavakoli, M.; Tavakoli, H.; Rajabipour, A.; Ahmadi, H.; GharibZahedi, S. M. T. Moisture-dependent physical properties of barley grains. **International Journal of Agricultural and Biological Engineering**, v.4, p.84-91, 2009.