# CENTESIMAL COMPOSITION OF MUNGUBA SEEDS (*Pachira aquatica*): A NON-CONVENTIONAL FOOD PLANT

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## Introduction

The *Pachira aquatica* Aublet is a tree species of the Malvaceae family, popularly called munguba [1]. It is a tree native to Mexico, Central America and northern South America, being widely used in Brazil for urban afforestation [1]. This tree produces a dry, dehiscent, capsule-shaped fruit, where seeds are found inside them, in the form of chestnuts [2, 3]. Munguba is included in the group of Non-Conventional Food Plants, meaning that this species is not produced or commercialized on a large scale, being restricted to local use, as in the case of Amazonian populations [4, 5]. In other words, their fruits tend to become organic waste and their food potential is wasted [5]. Thus, the objective of this study is to carry out a nutritional characterization of munguba seeds, as a preliminary study of their nutritional potential.

## Material and Methods

The fruits and seeds of *P. aquatica* were collected in the Quinta da Boa Vista city park, Rio de Janeiro (RJ), Brazil. The fruits were opened spontaneously by dehiscence. The released seeds were taken to the Laboratory of Bromatology, Faculty of Pharmacy, of Universidade Federal Fluminense (UFF) and stored in a freezer (Consul) at -20ºC. The fruits and seeds were weighed in order to obtain the yield. The munguba seeds were ground in a blender (Mondial Turbo, L-900 W) and analyzed for proximate composition, where the moisture content was determined by drying in an oven (FANEM, 315 SE) at 105ºC, until constant weight; the ash content was determined by incineration in a muffle furnace (FANEM, 412) at 550ºC; the lipid content was quantified by direct extraction in Soxhlet (SOLAB) with petroleum ether; the protein content was quantified by the semi-micro Kjeldahl method, with a conversion factor of 6.25 and the total carbohydrate content by the Lane-Eynon method [6]. Nitrogen free extract fraction (Nifext) was calculated by difference (Nifext = 100 - (moisture + ashes + lipids + protens)). The Adolfo Lutz Institute shows the possibility of calculating carbohydrate by analytical method and Nifext in the same sample [6]. The total energy value was calculated using conversion factors for carbohydrates (4.0 kcal/g), proteins (4.0 kcal/g) and lipids (9 kcal/g) [7]. The results will be obtained through descriptive statistics, using the program Microsoft Office Excel 2019.

## Results and Discussion

To calculate the yield, 20 fruits were used. The percentage of munguba seeds per fruit was on average 36.52% (m/m), where the standard deviation was 10.88 and the coefficient of variation was 29.79%, showing the average yield that can be acquired, being a data of industrial interest [8].

The proximate composition of the seeds is shown in Table 1.

Table 1 - Centesimal composition of munguba seed

| Sample types | Moisture (g/100g) | Ashes (g/100g) | Lipids (g/100g) | Proteins (g/100g) | Carbohydrates (g/100g) | Nifext (g/100g) |
|---|---|---|---|---|---|---|
| **Wet base** | 49.39±1.90 | 2.68±0.03 | 24.00±1.57 | 7.12±0.28 | 9.11±0.26 | 16.80±2.84 |
| **Dry base** | - | 5.31±0.07 | 47.42±3.10 | 14.07±0.56 | 18.00±0.51 | 33.20±2.81 |

The fresh seed of *P. aquatica* has a high water content, reaching almost half of the total mass. Regarding the macronutrient concentrations, it is observed that the seed presented a predominant lipid

content. Therefore, it is an interesting seed for those looking to avoid fats of animal origin and/or new food alternatives of plant origin. Carbohydrates and fiber are other fractions present in the seed. The carbohydrate in a seed tends to represent nutritional reserves for the embryo [9]. In the case of fibers, it was possible to estimate their value due to the calculation of the Nifext fraction, which included carbohydrates and fibers. Such a calculation is used to estimate total carbohydrates, however there are articles that present this calculation without subtracting the fiber content, considering them as part of the non-nitrogen fraction [4, 10]. Thus, as the carbohydrate content was determined by a analytical method, it was possible to estimate a fiber content of 7.69 g/100g on a wet basis and 15.20 g/100g on a dry basis. Proteins are in a smaller fraction than other macromolecules. The ash corresponds to the inorganic fraction of the sample [6] . As for the energy value, a total of 280.93 kcal/100g was obtained on a wet basis and 555.12 kcal/100g on a dry basis. Such a seed has calories comparable to that of oilseeds, such as Brazil nuts, peanuts, cashew nuts, almonds, among others [11]. This means the seed of munguba may have technological applications for food industry.

## Conclusion

In this preliminary study, it was observed that munguba seed has a profile of macronutrients that make the species promising for human consumption. However, as it is a Non-Conventional Food Plants, its potential is undervalued. The next step is to apply its nutritional properties to the development of a water-soluble extract as an plant-based milk alternative.

**Acknowledgments**

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001. The authors would also like to express appreciation for the support of the FAPERJ (E-26/210.068/2021).

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