



Research Article

RESEARCH ARTICLE: PHYSICO-CHEMICAL CHARACTERISTICS OF NYMPHEA LOTUS CONSUMED IN CHAD

Makalao MM¹ and Traoré AS²¹Bongor Higher Normal School, PB 15, Chad²New Dawn University Bobo-Dioulasso 01 BP 234, Burkina Faso

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ABSTRACT

In order to evaluate the nutritional characteristics of *Nymphaea lotus* white and red variety purchased in the N'Djamena market, the contents of water, lipids, some minerals and vitamins were determined. The physicochemical analyzes carried out used standard methods. The results show that the highest lipid content is found for *Nymphaea lotus* of white color (2.75%) and the lowest content is noted for *Nymphaea lotus* of red color (1.84%). The highest content for micronutrients is noted for *Nymphaea lotus* white variety for phosphorus (2052.78 mg/Kg) and the lowest content is noted for *Nymphaea lotus* of red color for sulfur (0.027 mg/Kg). Copper content only exists in trace form for both varieties. White-colored *Nymphaea lotus* has the highest contents of dietary fiber (10.47 g/100g of DM), calcium (1293.62 mg/100g of DM) and fiber (320.81 mg/100g of DM). Red-colored *Nymphaea lotus* has the highest contents of water (8.45%), magnesium (862.28 mg/100g of DM), manganese (117.35 mg/100g of DM), zinc (15.64 mg/100g), sodium (221.76 mg/100g of DM). Consumption and the popularization of this legume among populations could be considered in order to ensure availability throughout the year to ensure food security and thus contribute to the fight against malnutrition.

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INTRODUCTION

Nymphaea lotus L. (Nymphaeaceae) also known as water lily or "bichne" in local Arabic belongs to a small family present in both temperate and tropical regions. They are easily recognized by their aquatic habit, their floating leaves, their flamboyant flowers, their several petals, their numerous stamens and carpels and their endospermous seeds with small embryos (Lucy, 2012). These seeds are consumed in several countries and offer a possibility of diversifying the diet in the delta and lower valley of the Senegal River (Gueye *et al.*, 2020). The plant has been reported to exhibit antimicrobial activity and to contain phenolic compounds and antioxidant potential (Saleem *et al.*, 2001), as well as toxicity and mutagenic actions (Sowwimo *et al.*, 2007). Several wild plant species such as *Nymphaea lotus* have reservoirs of vitamins and minerals that are still little explored. These species still remain wild foods in several countries made by women and children (Gueye *et al.*, 2019). Further investigations therefore deserve to be carried out in order to know the nutritional value and thus contribute to the diversification of the diet.

MATERIALS AND METHODS

The study environment and pretreatment

The samples were purchased on the market in the city of N'Djamena and which were previously collected by young children from the spilled ponds almost everywhere in the city

from september 2023 to november 2023. Then they were dried and pounded in a wood mortar. The flours are sifted in an Analyzenseib sieve. AFNOR-ASIMW: 500; Nr: 152014. Rahmen Edelsdahl. Dry matter, fiber, and protein were determined at the Food Quality and Control Study Center (CEQOCDA) in N'Djamena, Chad. Lipids were determined at the Laboratory of the Center for Biological, Food and Nutritional Sciences (CRSBAN) and all minerals were determined at the analysis laboratory of the National Soil Bureau (BUNASOLS) of Burkina Faso.

Determination of the water, ash and lipid content

The determination of the different contents is made as follows: water (in an oven maintained at 105°C for 3 hours until a constant weight is obtained), ash (oven muffle) and lipids (soxhlet) (AOAC, 1990; AOCS, 1990).

Determination of the content of calcium, copper, iron, magnesium, manganese and zinc

These minerals are contained in the ash obtained. These contents were determined using Atomic Absorption Spectroscopy (Soro *et al.*, 2013). The Spectroscope is a PELKINE Imer model 3110 device brand (Connecticut, USA). An Al-Ca-Cu-Fe-Mg-Si-Zn cathode lamp was used.

Determination of phosphorus, potassium, sodium and sulfur

Phosphorus (P), potassium (K) and sodium (Na) were determined by the Corning 430 brand flame photometer (Walinga *et al.*, 2008). The sulfur dosage was carried out using the method of Chaudry *et al.* (1992). Statistical analyzes Means and standard deviations were calculated using Excel software and the analysis of variance was calculated using SPSS 20.0 software.



Figure 1 *Nymphaea lotus* white

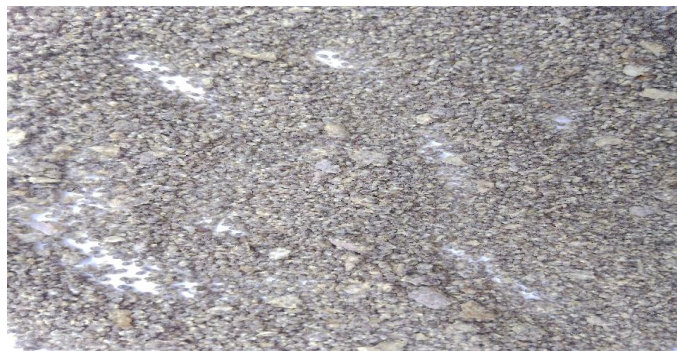


Figure 2 *Nymphaea lotus* red color

RESULTS

Table 1 Macronutrient and micronutrient contents

Species	Water g/100g de MS	Ash g/100g de MS	Lipid g/100g de MS	Fibers mg/100g de MS	Phosphorus mg/100g de MS
<i>Nymphaea lotus</i> white mg/100g DM	8,29±0,01	1,89±0,01	2,75±0,07	10,47±0,03	2052,66±1,88
<i>Nymphaea lotus</i> red color mg/100g DM	8,45±0,03	1,81±0,02	1,84±0,05	7,67±0,04	1537,18±1,81

DM: Dry Matter

Table 3 Micronutrients contents

Espèces	Zinc	Sodium	Sulfur	Fer
<i>Nymphaea lotus</i> white mg/100g DM	15,5±0,14	176,35±0,77	0,2±0,02	320,81±0,26
<i>Nymphaea lotus</i> red color mg/100g DM	15,64±0,07	221,76±0,90	0,02±0,002	296,86±1,07

DM: Dry Matter

DISCUSSION

The contents of some macronutrients are presented in Table I. The water contents of *Nymphaea lotus*, white in color, which is 8.29%, and *Nymphaea lotus*, red in color, is 8.45%. which are lower than black-colored *Nymphaea lotus* which is 9.66% and

red-colored *Nymphaea lotus* which is 13.36% (Gueye *et al.*, 2020). The lipid contents of white-colored *Nymphaea lotus* which is 2.75% and red-colored *Nymphaea lotus* is 1.84% which are lower than black-colored *Nymphaea lotus* which is 4.29% and *Nymphaea lotus* red in color which is 2.32% (Gueye *et al.*, 2020). The ash contents of white-colored *Nymphaea lotus* which is 1.89% and red-colored *Nymphaea lotus* is 1.81% which are lower than black-colored *Nymphaea lotus* which is 41.77% and *Nymphaea lotus* red in color which is 1.89% in Dakar, Senegal (Gueye *et al.*, 2020).

The contents of some micronutrients are presented in Table II and Table III. The calcium contents of white *Nymphaea lotus* which is 1293.62 mg/100g and red *Nymphaea lotus* is 1211.47 mg/100g which are lower than black *Nymphaea lotus* which is 188.81 mg/100g and *Nymphaea lotus* of red color which is 193.06% (Gueye *et al.*, 2020). The magnesium contents of white *Nymphaea lotus* which is 797.8 mg/100g and red *Nymphaea lotus* is 862.28 mg/100g which are lower than black *Nymphaea lotus* which is 312.71 mg/100g and *Nymphaea lotus* of red color which is 317.48% (Gueye *et al.*, 2020). The sodium contents of white *Nymphaea lotus* which is 176.35 mg/100g and red *Nymphaea lotus* is 221.76 mg/100g which are lower than black *Nymphaea lotus* which is 11.55 mg/100g and red-colored *Nymphaea lotus* which is 8.99% (Gueye *et al.*, 2020).

CONCLUSION

Gathered foods are even less consumed by the population such as the genus *Nympha lotus*. This food has demonstrated that the nutritional value remains important and deserves further investigation to better appreciate this food.

Conflict of Interests

The authors (s) have not declared any conflict of interests.

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