

EVALUATION OF THE ANTIOXIDANT POTENTIAL AND CELL VIABILITY OF SÃO JOÃO FLOWERS (*Pyrostegia venusta*)

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ABSTRACT

This study analyzed the concentration of phenolic compounds and cell viability of dehydrated and lyophilized "cipó-de-são-joão" (*Pyrostegia venusta*) flowers. The flowers were collected and subjected to different drying processes, revealing that lyophilization retains a higher amount of phenolic compounds compared to conventional dehydration. Both drying methods maintained high levels of cell viability, indicating that the consumption of these flowers does not cause harm to health. The results highlight the importance of choosing the drying method to preserve the nutritional and bioactive benefits of plants.

Keywords: Cytotoxicity. Non-conventional edible plants. Compound bioactive.

1 INTRODUCTION

Non-conventional edible plants (PANCs) play a relevant role as functional foods in the body by providing antioxidants, essential vitamins, minerals, and fibers, often not available from other food sources¹. Additionally, they possess nutritional properties and bioactive compounds with medicinal properties, contributing to individual health.

The inclusion of PANCs in the diet can be seen as a strategy to mitigate the challenges of global hunger, which result from social, economic, political issues, inadequate food distribution, and waste. *Pyrostegia venusta* (Ker Gawl.) Miers, popularly known as "cipó-de-são-joão" or "flor-de-são-joão," is a semi-woody climber of the Bignoniaceae family, named for its use as decoration during the São João festivals, which take place from north to south of the country². This species is native to almost the entire Brazilian territory and is often found scattered in fields, covering embankments, roadside edges, and even fences (Lorenzi, 2013).

However, like all PANCs, its potential needs to be explored, especially concerning food safety, to ensure that its consumption is safe and does not harm consumers' health. Additionally, the present compounds can bring health benefits to consumers, and their form of consumption or application in food products can significantly influence the compounds present.

In this context, the present study aims to evaluate the concentration of total phenolic compounds and the cytotoxicity of dehydrated and lyophilized "cipó-de-São-João" flowers for possible application in food products.

2 MATERIAL & METHODS

The flowers of "cipó-de-são-joão" (*Pyrostegia venusta*) were collected in the Fazenda Lageado region in Botucatu – São Paulo (22°51'02.3"S 48°26'09.5"W) and sanitized with sodium hypochlorite.

The flowers were dehydrated (FD) in a forced circulation oven (Marconi) at 45 °C for 12 hours, then ground using a knife mill. To obtain the lyophilized flowers (FL), the powder obtained after the drying process was subjected to extraction in a water bath (100 °C) with deionized water (10 mL) and then centrifuged at 3500 rpm for 10 minutes³. The obtained extract was dried using a lyophilizer, with a vacuum system operating at 10.2 m³/h at -30 °C, for 48 hours.

The concentration of phenolic compounds in the dehydrated and lyophilized flowers was determined by the Folin-Ciocalteu method⁴.

To assess the effects of the extract on cell viability, fibroblasts (3T3-E1) were allowed to grow in culture flasks containing RPMI culture medium (Gibco, Paisley, UK) supplemented with 10% fetal bovine serum (FCS; Gibco) and 100 U/mL penicillin and 100 µg/mL streptomycin (Gibco). Cells were incubated at 37°C in a humidified atmosphere with 5% CO₂ until they reached 80% confluence.

3 RESULTS & DISCUSSION

Phenolic compounds are a diverse class of natural compounds found in plants, known for their antioxidant properties and potential health benefits. They include flavonoids, phenolic acids, and tannins, among others. The quantity of these compounds can vary significantly depending on factors such as plant species, processing method, and growing conditions⁵.

The lyophilized flower showed a higher concentration of phenolic compounds compared to the dehydrated flower (Figure 1). Specifically, the phenolic compound content in the lyophilized flower was reported as 7858.38 ± 563.75 , while in the dehydrated flower it was 2937.12 ± 626.20 . This significant difference can be attributed to the lyophilization process. Lyophilization is considered a drying method that can help retain more phenolic compounds⁶ compared to conventional dehydration, which can result in nutrient loss due to heat and prolonged exposure.

Additionally, the difference in phenolic compound content may also be influenced by the possible degradation of these compounds during the dehydration process.

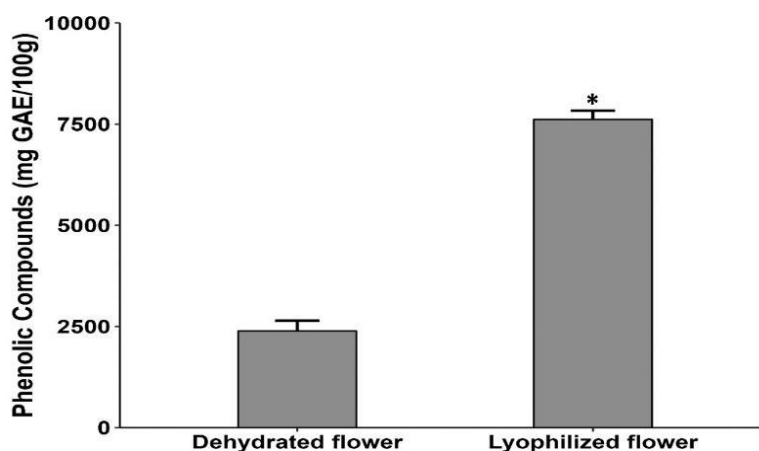


Figure 1 Total phenolic compounds of dehydrated and lyophilized Cipó-de-São-João flowers.

Cell viability is a measure of the ability of cells in a sample to maintain their vital functions and survive under certain conditions. It can be influenced by various factors, including the integrity of the cell structure, the preservation of bioactive components, and the potential for oxidation during processing.

The results indicate that both the dehydrated and lyophilized flowers show high percentages of cell viability (Figure 2). Thus, the dehydrated or lyophilized flowers did not induce cell death after 24 hours and can be consumed without causing harm to the consumer's health.

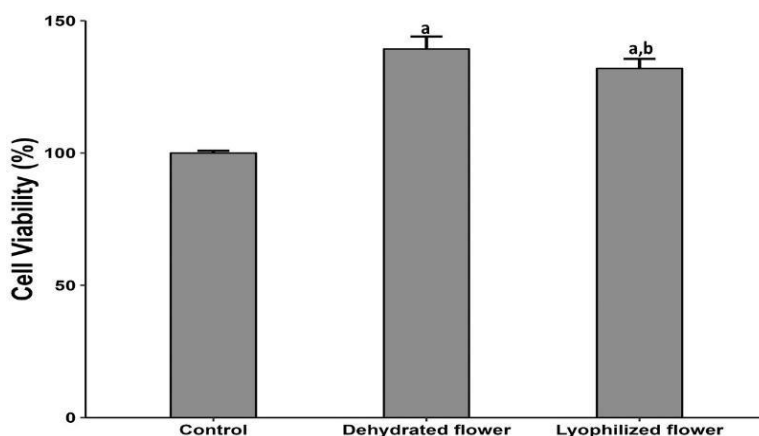


Figure 2 Cellular viability of dehydrated and lyophilized Cipó-de-São-João flowers.

4 CONCLUSION

lyophilization can be considered the preferred technique to preserve the nutritional and bioactive benefits of these flowers. Additionally, the high cell viability observed suggests that both processing methods result in products that are safe for human consumption. These findings highlight the potential of "cipó-de-são-joão" flowers as functional foods, encouraging their inclusion in diets to promote health.

REFERENCES

- ¹ MILIÃO, G. L., OLIVEIRA, A. P. H., SOARES, L. S., ARRUDA, R. T., VIEIRA, E. N. R., JUNIOR, B. R. C. L. 2022. *Future Foods*. 5. 100124.
- ² LORENZI, H.; SOUZA, H. M. de. 1999. *Plantas ornamentais no Brasil: arbustivas, herbáceas e trepadeiras*. 2. ed. Instituto Plantarum. Nova Odessa, São Paulo.
- ³ LI, S; LI, SK; GAN, RY; SONG, FL; KUANG, L & LI, HB (2013). Antioxidant capacities and total phenolic contents of infusions from 223 medicinal plants. *Industrial Crops and Products*, 51, 289–298.
- ⁴ SINGLETON, EL; ORTHOFER, R & LAMUELA-RAVENTÓS, RM (1999). Analysis of total phenols and other oxidation substrates and antioxidants by means of folin-ciocalteu reagent. *Methods in Enzymology*, 299, 152-178.
- ⁵ SADEGHİ, A., RAJABIYAN, A., NABIZADE, N., NEZHAD, N. M., ZAREI-AHMADY, A. 2024. *Int. J. Biol. Macromol.* 266 (1). 131147
- ⁶ MUHOZA, B., YUYANG, B., URIHO, A., HARINDINTWALI, J. D., LIU, Q., LI, YANG. 2023. *Food Hydrocolloids*. 140. 108650.