ASPECTOS BOTÂNICOS E MEDICINAIS DE *Hygrophila* R.Br. (ACANTHACEAE) DE OCORRÊNCIA NO CERRADO

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ABSTRACT
The Acanthaceae comprise approximately 4,900 species and 190 genera, predominantly herbaceous to subshrub. **Objective:** This study describes the morphology of *Hygrophila* found in the Experimental Unit – UniEVANGÉLICA, Anápolis, and conducts a literature review on the medicinal potential of different species of this genus, aiming to contribute to the pharmacognostic knowledge of the group. **Methods:** Specimens of *Hygrophila* were collected and analyzed. The morphology of the plants was described in detail, following established taxonomic criteria for the genus. In parallel, a comprehensive bibliographic review was conducted on the medicinal action of different *Hygrophila* species, focusing on phytochemical studies and biological activities reported in the literature. **Results:** Morphological analysis of the specimens confirmed the identification of the species found and highlighted their distinctive features. The literature review revealed vast medicinal potential for *Hygrophila* species, with numerous studies reporting biological activities (antimicrobial, anti-inflammatory, antitumor, and antioxidant). The secondary metabolites most frequently found in *Hygrophila* species include terpenoids, alkaloids, and flavonoids, which are responsible for many of the pharmacological activities described. **Conclusion:** The study demonstrated the importance of *Hygrophila* species from both botanical and pharmacological perspectives. The detailed morphological description contributes to the identification and classification of species, while the literature review on medicinal potential highlights the relevance of these plants for the development of new drugs. The results obtained reinforce the need to deepen studies on the genus *Hygrophila*, particularly regarding its chemical biodiversity and therapeutic applications.
Keywords: *Hygrophila*; Acanthaceae; Taxonomy; Phytochemistry.

INTRODUCTION

The Acanthaceae family is grouped among phanerogamic plants, belonging to the order Lamiales (APG IV, 2016), with approximately 4,900 species and 190 genera (MANZITTO-TRIPP et al., 2022). They are predominantly herbaceous to subshrub in habit. For the genus *Hygrophila* R.Br, the following morphological characteristics of taxonomic value are described: herbs, annual or perennial, often aquatic, with sessile or petiolate leaves, presence of cystoliths, sessile flowers, axillary or terminal, forming whorls, spikes, or thyrses, 5-lobed calyx; bilabiate corolla, anterior lip 2-lobed, posterior lip 3-lobed, apex of the upper lip slightly toothed, with 2 or 4 stamens, and discoid seeds with hygroscopic trichomes (MONTEIRO, F.K.S., 2020).

According to the Flora and Funga of Brazil (2020), only seven species are described for the country: *H. acutangula* Nees ex Mart, *H. costata* Nees & T. Nees, *H. guianensis* Nees ex Benth., *H. hirsuta* Nees, *H. humistrata* Rizzini, *H. nordestina* F.K.S. Monteiro, and *H. paraibana* Rizzini. The medicinal literature of Eastern countries

already well establishes that different species of *Hygrophila* present considerable economic value among Asian populations—often associated with their pharmacological and therapeutic potential. Phytochemical analyses frequently report **terpenoids**, **alkaloids**, and **flavonoids** in specimens from these regions. The biological characterization of specimens, regarding their therapeutic action, includes antimicrobial, anti-inflammatory, antitumor, antioxidant (KSHIRSAGAR, 2010), as well as aphrodisiac and spermatogenic activities (VYAS, 2016).

With the purpose of contributing information about this taxon, the present study aimed to describe the morphology of specimens identified at the Arthur Wesley Archibald Experimental Unit of the *Universidade Evangélica de Goiás*, Anápolis, Goiás, as well as to review the medicinal action of already studied species, thereby contributing to general pharmacognostic studies.

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MATERIALS AND METHODS

For the present study, five expeditions were carried out to the Arthur Wesley Archibald Experimental Unit of the *Universidade Evangélica de Goiás* (-16.290797522187297, -48.938435934350956), during the months of November 2023, April, May, and June 2024. Wooden presses, Google Maps, a Canon EOS Rebel Kit T100 camera, and other collection materials were used, and the collected specimens were deposited in the Herbarium of the *Universidade Estadual de Goiás – HUEG*.

To describe the morphology of the specimens, identification keys from the Flora and Funga of Brazil (2020) were used. A botanical plate was prepared with the aid of image editing software, such as Canva and Remove BG. To understand the therapeutic profile of different *Hygrophila* species, the following databases were consulted: SciELO and PubMed. The morphological description followed identification keys proposed by specialists.

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RESULTS

After collecting the specimen, a high degree of morphological modification (phenotypic plasticity) was observed. This occurred due to the environmental conditions to which the material was subjected (completely outside water and conditioned under a new physical environment for a few hours). *Hygrophila* R.Br is commonly an aquatic plant, but it can also present a terrestrial substrate (often characterized as an amphibious plant). For this reason, cultivation of certain species is justified in partially moist environments and waterlogged soils. The material collected was completely submerged; thus, to preserve the specimens, only water was used. This factor was responsible for significant morphological variation, especially of the leaves.

Figure 1 – Botanical Plate of *Hygrophila costata* Nees & T. Nees

Source: Cavalcanti, E.N. (Author)

A – Habit; **B** – Premature stage of the corolla; **C** – Stem; **D** – Anterior lip, 2-lobed; **E** – Posterior lip, 3-lobed; **F** – Corolla unopened; **G** – Raceme-type inflorescence; **H** – Vegetative structure; **I** – Leaf blade; **J** – Quadrangular stem.

These conditions outlined several factors of complex taxonomic determination, mainly due to the phenotypic condition of the leaf interface. Nevertheless, the following results were described for *H. costata*: lanceolate leaf blade, quadrangular stem, axillary spike inflorescence, and bilabiate white corolla. Pollen grain morphology was not evaluated.

From a pharmacological perspective, extracts of plants of the genus *Hygrophila* R.Br demonstrate antitumor activity (MAZUMDAR et al., 1997), antibacterial properties (KHAN and OMOLOSO, 2002), hepatoprotective effects (RAJ et al., 2010; SHANMUGASUNDARAM and VENKATARAMAN, 2006), as well as inhibition of nephrotoxicity under induced conditions (BIBU et al., 2010). For *H. difformis*, a taxon commonly used in aquarium ornamentation, pharmacognostic studies demonstrate significant protective activity against strychnine- and leptazol-induced seizures (PAL and SAMANTA, 2011). Furthermore, in terms of pharmacognostic potential, some species show better results when leaves are evaluated, being more effective than root extracts. Root extracts presented activity only against Gram-negative bacteria (CHANDRAN, 2013).

CONCLUSION

It is concluded that the taxon studied presents considerable economic value (e.g., in ornamentation) and different therapeutic actions (such as antitumor, antibacterial, antioxidant, and hepatoprotective), especially in the leaves, as well as high morphological variability (due to phenotypic plasticity) under different environmental conditions. This is a strong indicator for further and promising studies regarding the genetic investigation behind these results, in order to better characterize and taxonomically determine the species and to elucidate the pharmacological activity from a genomic perspective.

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