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## CABOMBACEAE IN SARAWAK, MALAYSIA

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### ABSTRACT

Cabombaceae is a family of aquatic flowering plants found in tropical and temperate regions. It is a small family with two genera and only seven species in total. The study of Cabombaceae in Sarawak has never been reported scientifically, although there have been reports in students' theses. This study reports the first confirmed scientific record of the *Cabomba* species in Sarawak. Only two species have been recorded so far in Sarawak, namely *C. furcata*, which has been recorded along the Selangau – Mukah road, and *C. caroliniana*, which has been recorded in a palm oil plantation in Sabal, marking a new record for Sarawak. With this report, knowledge about exotic and invasive plants in Sarawak is enhanced for management purposes.

**Keywords:** Borneo, *Cabomba*, *C. caroliniana*, *C. furcata*, Cabombaceae, Sarawak



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## INTRODUCTION

The Cabombaceae family, commonly known as water shield, consists of aquatic, herbaceous flowering plants. It includes two genera, *Cabomba* Aubl. and *Brasenia* Schreb., with only seven species registered (Appendix 1). These plants are characterized by their submersed growth, with cylindrical, slender rhizomes that root at the nodes, and they often have dimorphic leaves that can be either floating or submerged (Williamson & Schneider, 1993). Studies have shown that the Cabombaceae family is sometimes grouped with the Nymphaeaceae family under a broader classification (Angiosperm Phylogeny Group, 2009). Research on the phylogeny, classification, and biogeography of these families has been conducted, highlighting their evolutionary relationships (Simpson, 2010). The Angiosperm Phylogeny Group IV system recognizes Cabombaceae as a distinct family, emphasizing its unique characteristics within the aquatic plant community (Angiosperm Phylogeny Group, 2016).

Cabombaceae plants typically exhibit reddish-brown stems and dark green, glossy leaves, making them visually appealing for aquariums. The leaves can be simple and undivided or highly divided, depending on whether they are floating or submerged. The stem structure is atactostelic, which is a type of vascular arrangement found in some aquatic plants (Williamson & Schneider, 1993). Research on the reproductive biology of Cabombaceae, particularly focusing on *C. caroliniana* A. Gray, has provided insights into pollen and anther development (Williams *et al.*, 2008). This study characterized the complete ontogenetic sequence of pollen, which is crucial for understanding the evolution of reproductive traits in seed plants (Taylor *et al.*, 2008). Additionally, the morphological structure of carpels in *Brasenia* has been examined, revealing unique features such as a long stigmatic crest (Endress, 2005).

## METHODOLOGY

During a study on invasive aquatic plants in Sarawak, from 2018 to 2025, several fieldworks were conducted at several selected locations across Sarawak, including Kuching, Samarahan, Serian, Sri Aman, Betong, Sibu, and Mukah. Data collections were carried out in various water bodies such as ponds, ditches, irrigation canals, rivers, and other water bodies near towns, settlements, industrial areas, and villages. Several study plots were established in areas where invasive aquatic plants were identified (the report will be published in a separate paper). Voucher specimens were collected and prepared as herbarium specimens for species identification and verification. Specimen identification was performed at the herbarium of Sarawak Forest Department (SFD) and the herbarium of Universiti Malaysia Sarawak. Identification was also done using available taxonomic keys, such as those in Barbosa *et al.* (2019).