



RESEARCH ARTICLE

ORGANIZATION OF THE INFLORESCENCE AND FLOWER OF *MYRIANTHUS ARBOREUS* (P. BEAUV) IN FIVE LOCALITIES OF CÔTE D'IVOIRE

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ABSTRACT

Edible wild species such as *Myrianthus arboreus* represent one of the main sources of supply for human food in rural areas. However, the harmful effects of climate change, the low rate of regeneration coupled with the abusive exploitation of *Myrianthus arboreus* lead to its increasingly difficult supply. This study aims to understand the structure of the inflorescence and flower of *Myrianthus arboreus* with a view to genetic improvement. The inflorescences and the female flower were observed directly in the field. As for the male flower, it was carefully observed in the laboratory with a microscope. In *Myrianthus arboreus*, on a tree, only one type of inflorescence was observed: the male inflorescence or the female inflorescence. However, of the 150 individuals evaluated, individuals (10.66 %) showed the coexistence of both types of organ. The male inflorescence bears numerous tiny flowers, invisible to the naked eye. Each flower bears four sepals and four petals combined, thus forming the tepals on which four stamens are inserted with the anthers at the top. The female inflorescence is a globose flower head which bears numerous quarters, each corresponding to a flower. This capitulum when mature bears stigmata which appear outside the areas and are receptive. Based on this study, in *Myrianthus arboreus*, in addition to dioecious individuals, there are monoecious individuals.

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INTRODUCTION

For several decades, humans have obtained their food by gathering edible items from plants or plant parts such as roots, stems, leaves, flowers and seeds (Shirsat *et al.*, 2023). It is now clear that all cultivated plants today were known as wild edible plants. To this day, many of these plants still remain in the wild. Today, the domestication of wild plants of both food and medicinal interest is a necessity. According to Imathiu (2021), this necessity is absolutely necessary in developing countries whose numerous rural and peri-urban populations heavily exploit these resources to fight against malnutrition, but also for care and other uses. This is the case of *Myrianthus arboreus*, a dioecious plant which belongs to the Cecropiaceae family. *Myrianthus arboreus* is a wild food plant of forest and fallow areas, much appreciated for its young leaves. It occupies a crucial place in the socio-economic development of local communities at the nutritional, medicinal and economic levels (Kouamé *et al.*, 2015 ; Bobuya *et al.*, 2023). According to FAO & SEP-REDD+ (2017) and IFFN (2021), Côte d'Ivoire has lost more than two thirds of its forest cover in 50 years due to an annual rate of deforestation estimated at 10 %.

This continued deforestation further exposes genetic resources and particularly edible wild species such as *Myrianthus arboreus*, which produce fruits, leaves and seeds. Additionally, sourcing *M. arboreus* leaves is becoming increasingly difficult. Therefore, the domestication of this species is necessary to ensure its availability. However, recent work carried out in Côte d'Ivoire in this direction presented a low seed germination rate and cutting rate (Akaffou *et al.*, 2018 ; Oboho *et al.*, 2020). Thus, studying the organization of the flower and inflorescence of *M. arboreus* could be an avenue to explore to improve the results of domestication of this species. The present study therefore aims to know the structure of the inflorescence and the flower of *Myrianthus arboreus* with a view to its domestication. To achieve this objective, an observation of the inflorescence and the flower was made in five localities in Côte d'Ivoire.

MATERIAL AND METHODS

Choice of collection areas: The collection of samples was carried out in Côte d'Ivoire in five very distinct localities (Abengourou, Adzopé, Daloa, Diabo and Zouan Hounien)

whose climatic conditions are favorable to the development of *M. arboreus*. In these localities, *M. arboreus* occupies an important socio-economic place (Tia et al., 2019; Magbukudua et al., 2022).

Plant material: The study focused on 150 adult wild plants of *M. arboreus*, distributed among the localities sampled at a rate of 30 per locality including 15 males and 15 females.

Observation of inflorescences and flowers: Visible to the naked eye, the inflorescences and female flower of *M. arboreus* were observed directly in the field. Using a microscope, the male flower was carefully observed in the laboratory.

RESULTS

Organization of the inflorescence and male flower of *M. arboreus*: In *M. arboreus*, the male inflorescence is articulated with numerous spathes. At the immature stage, it is green in color and turns orange-yellow at the mature stage (Figure 1). Numerous and tiny flowers invisible to the naked eye are carried by this inflorescence. Each tiny flower bears four (4) sepals and four (4) petals which together form the tepals on which four (4) stamens with the anthers at the top are inserted (Figure 2).

Organization of the inflorescence and female flower of *M. arboreus*: The female inflorescence is a globose flower head with numerous quarters, each of which corresponds to an ovary (Figure 3). This flower head is small in the immature stage but in the mature stage, it is large with stigmas appearing outside the areas which are receptive.



Figure 1. Immature (green) and mature (orange-yellow) male inflorescence of an adult individual of *Myrianthus arboreus*

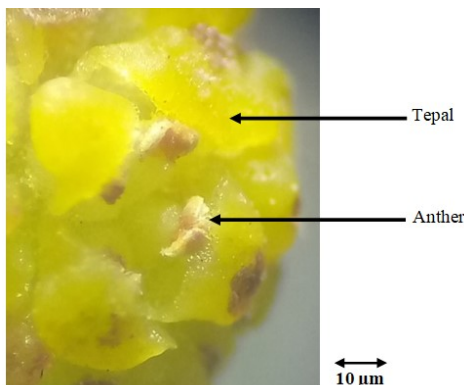


Figure 2. Careful observation of a male *Myrianthus arboreus* flower under a microscope (40x)



Figure 3. Immature (a) and mature (b) female inflorescence of an adult individual of *Myrianthus arboreus*

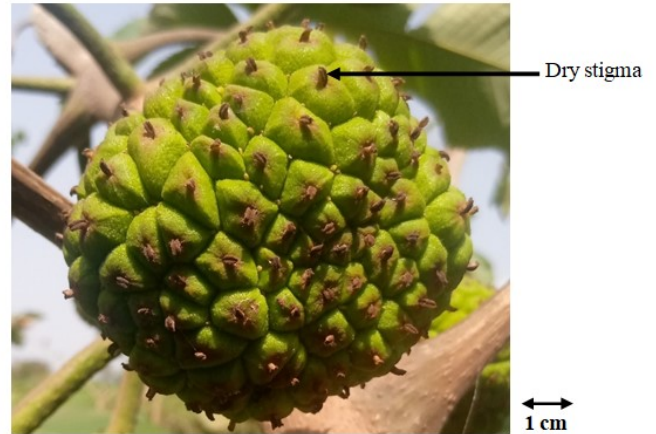


Figure 4. Knotted fruit of *Myrianthus arboreus*

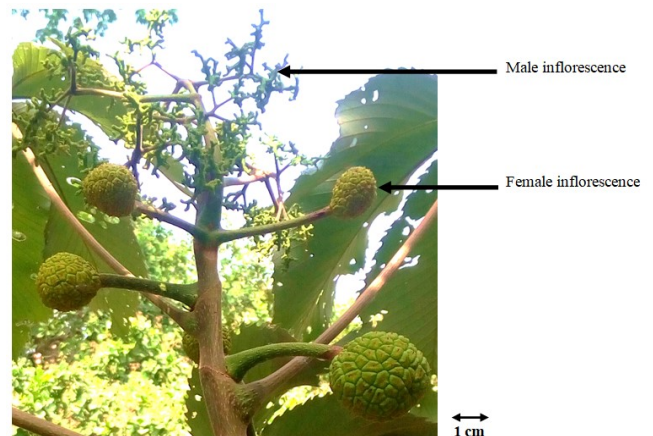


Figure 5. *Myrianthus arboreus* plant with both male and female inflorescences

Once the flowers are fertilized, the stigmas dry and the mature inflorescence transforms into a set fruit (Figure 4). However, of the 150 individuals evaluated, exceptional individuals were identified. These individuals have both male inflorescences located in the upper part and female inflorescences in the lower part (Figure 5).

DISCUSSION

Organization and structure of the inflorescence of *M. arboreus*: Inflorescences directly influence the reproductive success of a plant by presenting flowers in space and time (Kirchoff et Claben, 2013). Thus, knowledge of the organization of the inflorescence and flower of a species is important for its domestication. The work revealed two types of inflorescences in *Myrianthus arboreus*: the male inflorescence and the female inflorescence.

However, of the 150 individuals evaluated, individuals (10.66 %) presented the coexistence of both types of organ. The coexistence of these two types of organ could be explained by the fact that there exist monoecious individuals as is the case in the castor oil whose inflorescence is a monoecious cluster. Indeed, the work of Anjani (2012) demonstrated that castor oil, although diploid, presents differences in terms of sexual tendency. Environmental factors could also be the basis of this coexistence. Thus, according to the work of Tan *et al.* (2016), environmental factors such as season, temperature, photoperiod, light affect the sexual expression of castor bean.

Organization and structure of the flower of *M. arboreus*: According to Sauquet *et al.* (2017), directly or indirectly, flowers represent the reproductive structures of flowering plants (angiosperms). Flowers are visible to the naked eye for most angiosperms. *Myrianthus arboreus* flowers are small structures invisible to the naked eye; however, only the stigmas of the female flower are visible. This observation could lead to difficulties in extracting pollen grains in this species, which would make hybridization somewhat difficult. Furthermore, the receptive phase of *M. arboreus* could be marked by the external stigmas of the female flower. Our work contrasts with that of Dao (2012) on the species *Piliostigma reticulatum* who showed that there is no sexual dimorphism in flower size in this species. Nevertheless, the existence of a temporary stigma color dimorphism in female *P. reticulatum* would mark the phase of stigma receptivity.

CONCLUSION

The present study made it possible to understand the structure of the inflorescence and the flower of a spontaneous food species, *Myrianthus arboreus*, helping to reduce poverty in rural areas. This study showed that in *M. arboreus*, there are plants that are monoecious and others that are dioecious. The acquisition of these scientific databases is an important step for the domestication of *M. arboreus*. Efforts must therefore be made to improve knowledge of the plant, its use and its conservation. To do this, methods for extracting and preserving pollen grains for hybridization and carrying out domestication tests are necessary.

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