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The oilseed palm *Acrocomia*: Unlocking flowering patterns of various wild types from Brazil

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Abstract

Acrocomia, an oilseed palm species endemic to the subhumid tropics of South and Central America, is feasible for sustainable vegetable oil production in areas where oil palm cultivation is limited. The wild populations of *Acrocomia* are morphologically diverse and their adaptation to a wide range of soil and climate conditions makes them important components of silvopastoral systems in Brazil. However, the knowledge of variations in flowering patterns is limited but crucial for a better understanding of mating opportunities and yield formation. These palms produce multiple inflorescences that flower sequentially from October to December. Since *Acrocomia* is protogynous, cross-pollination is dominant. Therefore, this study aimed to evaluate the flowering patterns, including the onset, peak, synchrony, and frequency of different *Acrocomia* wild types originating from various regions of Brazil. The study was carried out at the living germplasm collection BAG-Macaúba maintained by the University of Viçosa, Brazil, and located in Araponga, MG, Brazil. The flowering progress and frequency of six accessions (31 palms in total) were monitored from 2019 to 2021. Fruit set was assessed for the years 2019 and 2020. The statistical exploration of the flowering pattern was done using circular statistics, which accounts for the circular nature of phenological data. Circular statistics ensure proper representation of central tendency and avoid distortions (e.g. bias of calculated mean) near the turn of the year because they treat time as a circular scale, preventing January and December from being considered as separate endpoints, thereby reducing the impact of boundary effects on the data.

Over three years, 382 inflorescences were documented, 120, 166, and 96 in 2019, 2020, and 2021, respectively. Flowering generally started in September and continued until the end of January, with the peak in the second half of November. The accessions varied strongly in their number of inflorescences and flowering onset, ranging from mid-September to mid-November. The individual palms of each accession showed high variability in their flowering frequency. Nevertheless, the flowering pattern of each accession remained similar between years. Through a redundancy analysis, solar radiation and rainfall were found to be the major impacting factors on flowering time.

Keywords: Brazil, circular statistics, oilseed palm *Acrocomia*, phenological flowering patterns, sustainable vegetable oil