Abstract

Tree architecture plays a crucial role in agroforestry systems, impacting shading, light penetration, wind resistance, biomass production, and the quality and quantity of valuable outputs such as timber and latex. Optimizing the architectural characteristics of rubber trees is essential to enhance the productivity and resilience of rubber-based agroforestry systems (RAS), especially in the context of climate change. This study aims to identify key architectural traits within an F1 population derived from the crossbreeding of clones PB 260 and SP 217. Broad-sense heritability (H^2) analysis identified ten architectural traits with heritability values ≥70%, highlighting them as key attributes. Principal component analysis (PCA), agglomerative hierarchical clustering (AHC), and Kendall correlation test revealed three primary crown-type clusters in the F1 population: broom-type, conical-type, and round-type crowns. Based on literature reviews, these crown types play a critical role in influencing light distribution and shading within intercropping systems, allowing them to be tailored to the specific intercrop species adopted in RAS. Furthermore, these crown architectures contribute significantly to tree stability under strong wind conditions. For latex and biomass production, genotypes with larger trunk girth and greater wood volume demonstrate substantial potential for development as latex-timber clones. Overall, this study provides valuable preliminary insights into rubber tree architectural traits, offering a foundation for further research and development to maximize the productivity, adaptability, and sustainability of RAS.

Keywords: crown-types, intercropping system, wind resistance, latex-timber clones