ECOLOGY, PHYTOCHEMICAL VARIABILITY AND BIOACTIVITY OF *Citropsis articulata*, A THREATENED MEDICINAL PLANT: IMPLICATION FOR EX-SITU CONSERVATION IN UGANDA

ABSTRACT

Despite the enormous conservation efforts and campaigns by various conservation bodies around the globe, the number of medicinal plants joining the threatened plant red list of the IUCN keeps growing by the year. In Uganda, various reports have emerged regarding the vulnerability of Citropsis articulata, a potent medicinal plant. Even so, there is limited empirical data regarding the ecology and medicinal potential of this plant in the country. Therefore, this study was aimed at investigating the geospatial determinants of occurrence, phytochemical variability and bioactivity of C. articulata in three forest reserves (Mabira, Budongo, and Kibale) in addition to depicting the suitable conditions for its ex-situ production. The study was carried out in 15 compartmental sites in each of the three study forests. In each compartmental site, 4 plots of 60 m X 60 m were systematically established and within each plot, 4 subplots each of size 20 m X 20 m randomly established. A total of 240 subplots were assessed for occurrence of Citropsis articulata in each forest. Leaf morphological variability in individuals of *Citropsis articulata* from three tropical forests in Uganda was assessed using both traditional and geometric morphometrics. Additionally, phytochemical components from leaves of the geographical populations of *Citropsis articulata*, were extracted with water and methanol using infusion and maceration methods, respectively and quantities of secondary metabolites established using UV-Vis spectrophotometric based methods and high-performance liquid chromatography. In vitro antimicrobial activities of the samples were examined against standard strains of common pathogenic microbes including Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and Candida albicans using agar well diffusion and microtitre plate-based assays while antioxidant activity was assessed using DPPH free radical scavenging assay. An integrated GIS based multi-criteria evaluation approach was used to depict suitable areas for production of C. articulata based on key factors of; climate, soil and topography. Results indicated a significant ($p < 0.05$) variation in the density of C. articulata with highest plant density recorded in Kibale National Park. *Citropsis articulata* generally occurred at moderate altitudinal landscapes (overall elevation = 1200.0± 20.73 m) with soils that are moderately acidic (overall pH = 5.7±0.10), low in salinity (overall salinity = 84.0± 3.84mg/l) and having moderate levels of macro and micronutrients. *Citropsis articulata* was generally associated with plant communities dominated by canopy tree species such as Chrosphyllum, Celtis, *Markhamia, Cynometra, Lasiodiscus, Trilepisium, Funtumia and Diosopyros*. There was a considerable overlap in the individuals of C. articulata from Budongo and Kibale while demonstrating some degree of variability of these individuals from their counterparts from Mabira, based on the morphology of terminal leaflets. Results showed a significant ($p<0.05$) effect of both the location and extraction solvent on the variation of secondary metabolites of C. articulata leaf extractives. The extracts also demonstrated bactericidal and fungicidal potency against the test microorganisms in the order; E coli > S. aureus > P. aeruginosa > C. albicans. Results also indicated that only a small portion of the country (13.0%) is very suitable to support natural production of C. articulata and this is majorly situated in the western and central parts of the country. This study presents key implications with regards to occurrence, phytochemical variability and bioactivity of C. articulata, to be considered when carrying out any ex-situ conservation efforts especially commercial cultivation of C. articulata. This study has also demonstrated that C. articulata leaves have potentially potent bioactive compounds that could be explored for future antimicrobial drug development.

Key words: Ecology, Phytochemical variability, Bioactivity, *Citropsis articulata*, Uganda