**DNA Barcoding in Sustainable Harvesting of Tree Species and Safety of Herbal Medicines Used in the Treatment of Malaria in Southern Ghana**

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## ABSTRACT

Herbal medicines continue to be used in every country around the world in healthcare delivery, however, due to poverty and high doctor to patient ratio; about 75% of the population of the developing world solely rely on herbal medicine for their primary health care. It is thus imperative to develop measures to maximize the medicinal potentials of indigenous plants to reduce the number of lives lost through diseases. However, most herbal products sold in public places lack scientific evidence for safety, quality and efficacy, and as the safety of herbal medicine depends on the ability to correctly identify the plants used in their preparation, this study sought to use DNA Barcoding to authenticate the identity of medicinal plants species used in the preparations of herbal medicines used to treat malaria and their sustainable management in southern Ghana. Leaf samples of 50 different plant species were collected in duplicate from three biodiversity hotspots; Bia Biosphere Reserve, Ankasa Resource Reserve and Kakum National Park and their DNA extracted and sequenced at the rbcLa gene region to serve as a background database for identification of those species. A success rate of 80% was achieved. A c1adogram was then generated from these sequences together with sequences of other tree species from Ghana in the Gene Bank of Consortium for the Barcode of Life Database for comparison. Each of the sequences correctly matched their counterpart which means that DNA barcoding can be used in the identification of all medicinal plants species. The study also sought to find out the medicinal tree species used in the treatment of malaria, and how herbalists identify the plant

species they use. Structured questionnaire and interview guides were used to seek information from herbalists, commercial herbal plants collectors and sellers In two different markets; Kasoa and Nyanyano, and the communities around three biodiversity hotspots; Ankasa, Bia and Kakum. Morphological identification was the only available method used for identification of medicinal plant species. Fifty plant species were found to be effective for the treatment of malaria in southern Ghana. Roots, bark and leaves were the commonly used part of the plants in herbal medicine preparation. The parts of plants used can affect the survival of some plants species. There was a hundred percent level of awareness of forest conservation in southern Ghana. DNA barcoding is the best identification tool for medicinal plant species which when accepted for use will completely eliminate misidentification and help in the proper documentation of medicinal plant species. This will inform on the proper conservation and management options for the protection of vulnerable species as well as the controlled harvesting and trade in vulnerable and important medicinal plants.

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