

DNA Barcoding as a Tool for Sustainable Harvesting of Medicinal Plants Used in the Treatment of Diarrhoea and Male Sexual Weakness in Ghana.

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ABSTRACT

Due to high poverty levels coupled with high patients to doctor ratio in Ghana, most people especially the urban poor and rural dwellers resort to herbal medicines which are quite cheap for their primary healthcare. Developing measures to maximize the medicinal potentials of indigenous plants will reduce the number of lives lost through diseases. A major setback is that most herbal products sold in public places lack scientific evidence for safety, quality and efficacy. 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 as (i) an identification tool in the authentication of herbal medicines and (ii) their sustainable management in southern Ghana. Silica-dried leaves samples from thirty seven different medicinal tree species covering 24 families, used in the treatment of diarrhoea and male sexual weakness from three different conservation areas: Ankasa, Bia and Kakum, were sequenced at the *rbcL* gene region. A success sequence rate of 94.59% was achieved for the *rbcL* gene region. To verify the authenticity of the reference DNA database produced from the thirty five medicinal tree sequences in the proper identification of medicinal plants species, silica-dried samples of eleven tree species from farmlands within the Akuapem North district of the Eastern region (specifically around Aburi and its environs) were sequenced in the *rbcL* gene region. All the eleven tree species had their counterparts successfully sequenced in the reference DNA database. A sequence success rate of 90.91 % was achieved, and each of the sequences in the verification data perfectly matched their counterparts in the reference database implying that DNA barcoding can be used in the identification of all medicinal plants species to ensure the safety of herbal medicines in Ghana. The study also sought to find out: (i) the medicinal tree species used in the treatment of diarrhoea, male sexual weakness or both, (ii) how herbalists identify the plants species they use, (iii) their availability, distribution abundance, (iv) the quantity of medicinal plants used in the treatment of diarrhoea and male sexual weakness per month, (v) the parts and sources of the plants species used and (vi) the awareness of forest conservation in southern Ghana. Structured questionnaire and interview guides were used to seek information from a purposive group

including herbalists, commercial medicinal plants collectors and sellers in two different markets; Kasoa and Nyanyano, and the communities around the three selected conservation areas; Ankasa, Bia and Kakum. The traditional method of identification was the only available method used for identification of medicinal plant species by both practicing herbalists and commercial plant collectors. Seventy three plants species were found to be effective for the treatment of diarrhoea and male sexual weakness or both. Roots were the commonly used part of the plants in herbal medicine preparation. The parts of plants used, and the rate of collection of some medicinal plants were found to affect the survival of some plants species. There was a hundred percent level of awareness of forest conservations in southern Ghana. DNA barcoding is the best identification tool for medicinal plants species which when accepted for use will completely eliminate misidentification and help in the proper documentation of medicinal plants species. This will inform on the proper conservation and management options for the protection of threatened species as well as the controlled harvesting and trade in vulnerable and important medicinal plants.

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