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Homegardens in Sudan - Domestication Spots for Wild Fruit Trees: The Case of *Ziziphus spina-christi* (L.) Willd.

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Abstract

The Christ's thorn jujube, *Ziziphus spina-christi* (Rhamnaceae) is one of the most important indigenous fruit tree species in Sudan. It has multiple food and cultural uses and contributes to income generation, particularly of women. Most fruits are collected in central and southern Sudan and traded all over the country. Fruits show a high phenotypic diversity with regard to colour, size, and taste, but so far the existing populations have not been characterised.

To fill this knowledge gap and to assess possible domestication processes 250 individual trees were sampled from agroforestry homegardens (N=125) and adjacent forests (N=125) of five different locations in the Nuba Mountains. Trees and fruits were morphometrically characterised and dried leaves used for molecular analysis by AFLP (amplified fragment length polymorphism). Pearson's coefficient was used to compute bivariate correlations and means were statistically analysed by t- and Mann-Whitney tests at $p < 0.05$. Regression analysis was used to identify environmental factors influencing fruit traits.

The sampled trees and fruits showed a high morphological diversity regarding stem diameter at breast height, fruit size and fruit weight. Fruit sizes decreased with increasing latitude and elevation (r=-0.352 and -0.405 respectively). Individual trees in homegardens had a significantly larger mean stem diameter at breast height than those in forests (16.1 and 12.6 cm, respectively). Multiple regression analyses showed a positive influence of the site 'homegarden' and the tree's canopy area, but a negative effect of elevation on fruit size and fruit dry weight (model adjusted R^2=0.315 and 0.384, respectively). First results of AFLP analysis revealed a clear genetic separation of populations from homegardens and forests, indicating differences among the populations' seed flow and history.

Semi-domestication by human selection combined with environmental effects may have caused the above mentioned differentiation of *Z. spina-christi* populations in the Nuba Mountains. This information on population structure of *Z. spina-christi* can be used to develop local domestication and *in situ* conservation approaches.

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