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Promotion of orphan crops in Africa: A quinquennat of research on kersting's groundnut [*macrotyloma geocarpum (harms)*] a pulse with the highest market value

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Background: Due to their resilience, orphan crops are alternatives to the difficult cropping environment caused by climate change and low fertile soils. Kersting's groundnut [*Macrotyloma geocarpum* (Harms.) Maréchal and Baudet] is an underexploited subterranean pulse that has high market value. In order to better understand the crop, develop tools for cultivar development that ultimately will promote and draw the maximum of its potential, the Non Timber Forest Products & Orphan Crop Unit at the Lab of Applied Ecology, has undertaken research and breeding actions on kersting's groundnut, hereafter named as KG.

Material & methods: The research performed ranged from baseline social studies to seed system and seed quality, through diversity studies, study of reproductive biology, high throughput phenotyping, proximate composition, nutritional profile, cooking ability, acceptability, and multi-location trials. Accessions of KG were gathered from all producing countries across West Africa and evaluated. DArT seq technology was used to assess diversity and UAV imagery enabled to compute vegetative indexes that are potential to serve for high throughput phenotyping and yield prediction. Mass selection also enabled identify superior accessions that have wide adaptation for cultivation in the major growing areas.

Findings: The various research undertaken permitted to understand the socio economical and cultural determinants of the cropping of KG, derived the

constraints that need to be alleviated for efficient promotion of the crop, and insights to traits that should be of interest to plant breeders. A product profile has been developed to describe the KG varieties that would meet the market demands. It was demonstrated that KG bears diversity among accession and across regions. Reproductive biology study revealed a protogynous flower with the presence of flexistily that tends to force selfings. The study of UAV vehicles to phenotype and predict yields, revealed vegetative indices with robust prediction accuracy for grain yields. High nutritional profile was found for KG, regarding proteins, essential amino acids and minerals, and fibers. There were accessions that cooked fast within 78 min, that recorded high acceptability scores. Also efforts were made to develop technical manual for the production of KG in tropical Africa.

Conclusion and significance: The research endeavours through the quinquennat, paved the way to cultivar development and sustainable production of KG. The bottlenecks that currently hinder hybridization and generation of breeding population have been identified and measures to remove them have been recommended. Mutation breeding has been recommended as an alternative for short term cultivar development. A product profile has been developed and made available for any breeder that might want to engage in variety development for KG. Recommendations have been made towards sustainable seed system for KG.

Biography

Dr. Eric Etchikinto Agoyi, a distinguished researcher with a PhD, is affiliated with the Non Timber Forest Products & Orphan Crops Unit at the Laboratory of Applied Ecology, University of Abomey-Calavi in Benin. His expertise lies in the intersection of ecology and sustainable agriculture, particularly focusing on non-timber forest products and orphan crops. Dr. Agoyi's work contributes significantly to the understanding and conservation of biodiversity in agricultural ecosystems.

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