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Cultivated Robusta coffee meets wild *Coffea canephora*: Evidence of cultivated-wild hybridisation in the Democratic Republic of the Congo

Authors: Verleysen Lauren[†1,2], Depecker Jonas[†*1,3,4], Bollen Robrecht[1,3], Asimonyio Justin[5], Hatangi Yves[3,6,7], Kambale Jean-Léon[5], Mwanga Mwanga Ithe[8], Ebele Tshimi[9], Dhed'a Benoit[6], Stoffelen Piet[3], Ruttink Tom[2,10], Vandelook Filip[1,3], Honnay Olivier[1,4]

[†]These authors contributed equally to this work

[1] Division of Ecology, Evolution and Biodiversity Conservation, KU Leuven, Leuven, Belgium

[2] Plant Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Melle, Belgium

[3] Meise Botanic Garden, Meise, Belgium

[4] KU Leuven Plant Institute, Leuven, Belgium

[5] Centre de Surveillance de la Biodiversité et Université de Kisangani, Kisangani, DR Congo

[6] Université de Kisangani, Kisangani, DR Congo

[7] Liège University, Gembloux Agro-Bio Tech, Gembloux, Belgium

[8] Centre de Recherche en Science Naturelles, Lwiro, DR Congo

[9] Institut National des Etudes et Recherches Agronomique, Yangambi, DR Congo

[10] Department of Plant Biotechnology and Bioinformatics, Ghent University, Ghent, Belgium

Running title: cultivated-wild hybridisation in wild *Coffea canephora* in Yangambi

*Corresponding author: jonas.depecker@kuleuven.be

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Abstract

Background and aims:

Plant breeders are increasingly turning to crop wild relatives (CWRs) to ensure global food security amidst a rapidly changing environment. However, CWR populations are confronted with various human-induced threats, including hybridisation with their nearby cultivated crops, posing a significant threat to the wild gene pool. Here, we focussed on Robusta coffee in the Yangambi region in the DR Congo, where cultivated Robusta coffee coexists with its wild relative (Coffea canephora), creating ample opportunity for genetic exchange. We examined the geographical distribution of cultivated Robusta coffee plants and the incidence of hybridisation between cultivated and wild individuals within the rainforest.

Methods:

We used Genotyping-by-Sequencing data from 471 C. canephora individuals across various locations, including natural rainforests, home gardens, and the INERA Coffee Collection, a Robusta coffee field genebank. Our analyses involved establishing robust diagnostic fingerprints that differentiate cultivated from wild coffee, identifying cultivated-wild hybrids and mapping their geographical position.

Key results:

We identified cultivated genotypes and cultivated-wild hybrids in zones with clear anthropogenic activity, and where Robusta coffee cultivated in the home gardens may serve as a source for crop-to-wild gene flow. We found relatively few hybrids and backcrosses in the rainforests, which is so far likely not sufficient for the stable incorporation of alleles from the cultivated gene pool into the CWR gene pool.