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Progress and Current Trends in Cassava Improvement in Sub-Saharan Africa by IITA and Partners

ELISABETH Y. PARKES¹, ISMAIL RABBI¹, RICHARDSON OKECHUKWU¹, EDWARD KANJU², MORAG FERGUSON³, PHENEAS NTAWURUHUNGA⁴, NZOLA-MESO MAHUNGU⁵, FEMI AINA¹, AFOLABI AGBONA¹, PAUL ILONA¹, ALFRED GILBERT DIXON¹, PETER KULAKOW¹

¹*International Institute of Tropical Agriculture (IITA), Nigeria*

²*International Institute of Tropical Agriculture (IITA), Tanzania*

³*International Institute of Tropical Agriculture (IITA), Kenya*

⁴*International Institute of Tropical Agriculture (IITA), Zambia*

⁵*International Institute of Tropical Agriculture (IITA), DR Congo*

Abstract

The International Institute of Tropical Agriculture (IITA) and partners have engaged in cassava improvement for over 45 years with over 400 variety releases in over 20 African countries. Cassava breeding and IPM have prevented losses of over US\$2 billion from pest and disease constraints such as the cassava mealy bug, cassava mosaic disease, cassava bacterial blight and cassava green mite. Recently, cassava brown streak disease losses and increased prevalence of abundant white flies have become severe constraints in East Africa with threats to West Africa.

Cassava improvement programs are modernizing by combining improved agronomic practices with use of genomic technologies, improved phenotyping and data management. Breeding objectives seek to improve dry matter content in varieties with high stable yield across diverse agro-ecological zones. Additional objectives include improved plant architecture, low cyanogenic potential, early material with good in-ground storage, improved nutritional and end-user qualities for diverse region specific uses, and improved performance with improved soil fertility management and weed control. Breeding programs are becoming more gender responsive to meet diverse needs of men and women cassava farmers including youth who will recognise cassava business as attractive and profitable.

Cassava breeding addresses distinct markets for high starch, white varieties for food and industry and markets for yellow biofortified varieties with enhanced pro-vitamin A content to improve diets and reduce Vitamin A deficiency. Six biofortified varieties released in Nigeria with beta carotene levels of 6.1 to 10.4 $\mu\text{g/g}$ of fresh weight will reach over 1 million farmers in 2015. One variety has been released in DR Congo and testing is underway with NARS in additional countries.

A revolution in understanding the cassava genome, genetic diversity and genetic markers associated with cassava traits is being applied using genomic selection and marker assisted selection to improve rates of genetic gain and reduce the time to deliver varieties to farmers. DNA technologies are helping to identify cassava varieties to understand adoption patterns and make decisions for future research.

Keywords: Beta carotene, dry matter, genomic selection, marker assisted selection, root yield, starch content