

## **Project Title: Implement MARS projects for drought tolerance**

Targeted Subprogram: Sub-Program 3 (Trait Capture for Crop Improvement)

Principal Investigator: Dr Emmanuel Okogbenin, National Root Crops Research Institute (NRCRI) Umudike.

Collaborating Scientists and Institutions

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2. Mrs Elizabeth Parkes, Crop Research Institute (CRI), Kumasi, Ghana
3. Dr. Joseph Adjerbeng, Savannah Agricultural Research Inst.(SARI), Ghana
4. Dr. Tim Setter, Cornell University, Ithaca, NY USA
5. Dr. Martin Fregene, Donald Danforth Plant Science Center, St. Louis, MO, USA
6. INRA (yet to be defined)

### **Executive Summary**

Although cassava produces more energy per unit area compared to other crops under marginal conditions of limited annual rain fall (<500mm) or a long dry season (5-6 months), yield potential under drought varies widely in the gene pool. Previous work revealed certain varieties from Africa are tolerant to drought. The afore-mentioned drought tolerant germplasm is the basis of an innovative molecular breeding scheme based on marker assisted recurrent selection (MARS) that seeks to deploy drought tolerance hybrids more widely in cassava gene pools of the major cassava growing agro-ecologies of West Africa.

The scheme employs a two-pronged approach: first, a drought tolerant genotype identified using phenotypic information will be used in crosses with a commonly grown elite lines and the progeny used for QTL mapping. Secondly, marker-assisted breeding through MARS will be employed to improve the efficiency of producing elite germplasm with exceptional performance under drought by identifying useful allele (QTL) combinations and pyramiding (and fixing) multiple sources of genes for drought tolerance into a set of new progenitors. Genotypic information will be generated by a high throughput SNP marker genotyping platform based on SNP marker resources currently being developed.

Partners in the project are two African NARs programs of Ghana, and Nigeria, Cornell University and an advanced genotyping facility to be identified. Indicators of success of the project include identification of molecular markers for selection of high yield and drought tolerance in breeding schemes. Other indicators are production of new cassava varieties that a) rank high in yield and perform better under drought than any currently available lines, b) are high ranking under non-drought conditions, and c) will serve as improved progenitors for future breeding of drought tolerance in cassava.