

COFEDIT

Coffee genetic engineering based on genome editing using CRISPR-Cas9 technology: a cutting-edge tool for functional analysis and breeding

ABSTRACT

Elucidation and manipulation of plant genomes is a key point for basic biology research and crop improvement. Developing genome edition biotechnological tool in coffee would greatly accelerate research and breeding of news varieties more adapted to current climate change.

Keywords : Developing the plant of the future, Plant, Genomics, Varietal improvement, Bioinformatic, Breeding, Method/tool/technic, Coffee

Year : 2014

Project number : 1403-015

Type of funding : AAP OS

Project type : AAP

Research units in the network : AGAP DIADE

Start date : 2015-02-01

End date : 2016-01-31

Flagship project : no

Project leader : Jean-Christophe Breitler

Project leader's institution : CIRAD

Project leader's RU : IPME-PHIM

Budget allocated : 29624 €

Total budget allocated (including co-financing) : 29624 €

Funding : Labex

GOAL

The main objective is to reconstruct a functional CRISPR-Cas9 system in the two cultivated coffee. The main scientific breakthrough is to develop a new set of tools to achieve chirurgical gene knockout in coffee species and to asses its efficiency, hence leading to significant advances in functional genomics and renewing the range of possibilities in coffee breeding.

ACTION

Bioinformatic tools and data integration into the coffee genome browser interface

Construction of 2 set of Binary vectors

Mutants regeneration and analysis

RESULTS

Development of algorithms to identify all sgRNA (single guide RNA) target sequences and all potential off-target for each sgRNA in coffee genome.

Identification of unique sgRNA target sequence in coffee genome coding sequence.

Data integration into the coffee genome browser interface (<http://coffee-genome.org/>).

Construction of 2 set of binary vector bearing one or two sgRNA, Cas9 genes and GFP.

C. canephora agrobacterium mediated genetic transformation protocol.

Regeneration and analysis of a large population of plants. Demonstration of CRISPR/Cas9 system efficiency in *C. canephora*.

PERSPECTIVES

The success of COFEDIT project will enable us, since 2017, to develop simplified and more efficient functional analysis tools as well as establishing in Agropolis a functional analysis platform available for the whole coffee community. These new tools will form the basis for developing new projects and new cooperation.