



**HAL**  
open science

## **Genome ENgineering Improvement for Useful plants of a Sustainable agriculture**

Fabien F. Nogué, Philippe Vergne, Anne-Marie Chèvre, Jean-Eric Chauvin, Oumaya Bouchabke, Annabelle Dejardin, Elisabeth E. Chevreau, Laurence Hibrand-Saint Oyant, Marianne Mazier, Pierre P. Barret, et al.

► **To cite this version:**

Fabien F. Nogué, Philippe Vergne, Anne-Marie Chèvre, Jean-Eric Chauvin, Oumaya Bouchabke, et al.. Genome ENgineering Improvement for Useful plants of a Sustainable agriculture. IUFRO Tree Biotechnology Conference 2015; Treebiotech2015, Jun 2015, Florence, France. 2015, Tree Biotechnology 2015 Conference "Forests: the importance to the planet and society". hal-02743151

**HAL Id: hal-02743151**

**<https://hal.inrae.fr/hal-02743151>**

Submitted on 3 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## Genome ENgineering Improvement for Useful plants of a Sustainable agriculture

Nogué Fabien<sup>1</sup>, Vergne Philippe<sup>2</sup>, Chèvre Anne-Marie<sup>3</sup>, Chauvin Jean-Eric<sup>3</sup>, Bouchabké Oumaya<sup>1</sup>, Déjardin Annabelle<sup>4\*</sup>, Chevreau Elisabeth<sup>5</sup>, Hibrand-Saint Oyant Laurence<sup>5</sup>, Mazier Marianne<sup>6</sup>, Barret Pierre<sup>7</sup>, Guiderdoni Emmanuel<sup>8</sup>, Mathis Luc<sup>9</sup>, Sallaud Christophe<sup>10</sup>, Matt Mireille<sup>11</sup>, Pierron Jean-Philippe<sup>12</sup>, Bonnel Eric<sup>13</sup>, Foucrier Séverine<sup>14</sup>, Toppan Alain<sup>15</sup>, Trannoy Laure<sup>16</sup>, Rogowsky Peter<sup>2</sup>

<sup>1</sup> INRA UMR1318 IJPB Institut Jean-Pierre Bourgin, Versailles, France

<sup>2</sup> INRA UMR0879 RDP Reproduction et Développement des Plantes, Lyon, France

<sup>3</sup> INRA UMR1349 IGEPP Institut de Génétique Environnement et Protection des Plantes, Rennes, France

<sup>4</sup> INRA UR0588 AGPF Amélioration, Génétique et Physiologie Forestières, Orléans, France

<sup>5</sup> INRA UMR1345 IRHS Institut de Recherche en Horticulture et Semences, Angers, France

<sup>6</sup> INRA UR1052 GAFL Génétique et Amélioration des Fruits et Légumes, Avignon, France

<sup>7</sup> INRA UMR1095 GDEC Génétique Diversité et Ecophysiologie des Céréales, Clermont-Ferrand, France

<sup>8</sup> CIRAD UMR108 Amélioration Génétique et Adaptation des Plantes méditerranéennes et tropicales, Montpellier, France

<sup>9</sup> Collectis, Paris, France

<sup>10</sup> Biogemma, Chappes, France

<sup>11</sup> INRA UMR1215 GAEL Laboratoire d'Economie Appliquée de Grenoble, Grenoble, France

<sup>12</sup> Faculté de Philosophie de l'Université Jean Moulin Lyon 3, Lyon, France

<sup>13</sup> Germicopa, Quimper, France

<sup>14</sup> Société Nouvelle des Pépinières & Roseraies Georges Delbard, Malicorne, France

<sup>15</sup> Vilmorin & Cie, Chappes, France

<sup>16</sup> INRA Transfert, Paris, France

\* [annabelle.dejardin@orleans.inra.fr](mailto:annabelle.dejardin@orleans.inra.fr)

*Key words: genetically modified crops; site-specific nucleases; gene targeting*

World agriculture needs to guarantee food security, replace fossil resources, decrease its environmental impact and adapt to a changing global climate. Whereas France and other European countries presently choose to meet the genetic aspect of these challenges by the sole use of conventional breeding, an increasing number of agriculturally important countries enlarge the available gene pool via transgenesis. Despite certain political concerns transgenesis is already an indispensable technology for French seed companies and public scientists to remain competitive at an international level.

Recent scientific advances in the field of transgenesis now provide answers to certain reserves of citizens and blur the border between breeding and transgenesis. In particular the advent of nuclease technology opens the way to extremely precise modifications of plant genomes at pre-determined sites. In this context it is strategic to ascertain top-level know-how in transgenesis in France, to actively participate in the debate of these new technologies and to demonstrate their applicability in a wide range of crop species.

If successful, the project **GENIUS (Genome ENgineering Improvement for Useful plants of a Sustainable agriculture)** will provide French researchers and plant breeders with state of the art know-how, the necessary biological material and connected intellectual property rights for precise genome modifications in a variety of crop and horticultural species (wheat, maize, rice, oilseed rape, tomato, potato, poplar, apple, rose), laying the basis for high

throughput functional genomics and efficient plant breeding. Proof of concept will concern disease resistance, salt tolerance, plant architecture and quality traits. Studies on the regulatory, economical and philosophical context will complement the experimental work.

To reach these goals, in an unprecedented effort, GENIUS has assembled a consortium of 15 public and private partners – 10 public research units in biological or social sciences with 5 biotechnology and seed companies. This consortium will create synergy between field- or species-oriented entities into a technology-oriented community.

The project started on September 1st, 2012 and will be developed over a period of 7 years and 4 months.

### **Competing interests**

The authors declare that they have no competing interests.

### **Acknowledgements**

GENIUS is supported by the Investment for the Future ANR program “Biotechnology and Bioresources”.