



Toulouse (France), 2016/06/28

## PRESS RELEASE

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### The sunflower genome has been decoded

INRA<sup>1</sup> scientists have just completed the sunflower reference genome sequence. This achievement comes as part of the SUNRISE<sup>2</sup> project in collaboration with the International sunflower genome consortium<sup>3</sup>. This major advancement will help improve varietal sunflower breeding programs, a very promising area of research which has proven to be an environmental asset for future agricultural systems. It will provide farmers with new varieties that are better adapted to production methods, food production and industrial uses, while also responding to the sector's economic challenges. The results will be made public during the "days exchanges on sunflower" conference taking place June 28 and 29, 2016 in Toulouse (France).

#### A global breakthrough.

INRA<sup>1</sup> scientists sequenced the genome of the sunflower line XRQ, a parent strain grown and developed by INRA. For the first time, the sunflower's DNA has been completely decoded. In other words, all of its genetic material (or its genome) has been analyzed, assembled and mapped. The sunflower genome sequence has been made available to SUNRISE partners for their breeding programs, and will be shared with the academic community during its public debut at the "days exchanges on sunflower" conference on June 28 and 29, 2016 in Toulouse (France).

#### The result of an innovative strategy.

The biggest challenge in reaching this achievement was assembling the genes, like the pieces of a puzzle, in the correct order. The giant puzzle that forms the sunflower genome is 20% larger than the human genome, and the more pieces there are, the more difficult it is to put them together. Over 80% of the sunflower's genome is composed of nearly identical pieces, which are difficult for computer programs to identify. Thanks to an innovative strategy using the latest generation sequencer PacBio RS II<sup>4</sup>, scientists were able to obtain a quality reference sequence. In fact, the PacBio RS II sequencer is able to read DNA fragments 100 times longer than could previous generation sequencers. The fragments are then easier to assemble in the correct order. This latest technology is now used for sequencing genomes for other cultivated or parasitic plants, for example the *Orobanche cumana*, which is a parasitic plant to the sunflower.

#### A valuable resource for improving sunflower varietal breeding.

The sunflower is a large-scale crop, of which 80% is produced in Europe, and it holds great potential for genetic advancement. The mapping of the sunflower genome opens up new opportunities for identifying genes of agronomic interest, or those with prospects in industry or food production. This contribution enhances the effectiveness of national and international sunflower breeding programs and will help introduce plant varieties on the market that are better adapted to the different agricultural practices. More specifically, the SUNRISE project will benefit from the decoded genome in order to identify genes associated with drought tolerance in response to a changing climate.

<sup>1</sup>Research team includes scientists from INRA Toulouse Midi-Pyrénées, from the Laboratory of Plant-Microbe Interactions (LIPM, INRA-CNRS), from the French Plant Genomic Resources Center (CNRGV, INRA) and from the INRA GeT-PlaGe genome platform.

<sup>2</sup>The SUNRISE project is funded in part by the French National Research Agency (number ANR-11-BTR-0005) and brings together 16 public and private partners working together to adapt the sunflower to climate change: <http://www.sunrise-project.fr/le-projet/presentation>

<sup>3</sup>This consortium is led by the University of British Columbia in Canada and by INRA.

<sup>4</sup>Run by several research teams from INRA Toulouse Midi-Pyrénées <sup>1</sup> for the SUNRISE project, supported by the Languedoc-Roussillon-Midi-Pyrénées Region and by industrial partners Sofiprotéol and Libragen, the GeT-PlaGe genome platform of the Toulouse Genopole acquired the PacBio RS II sequencer in 2015.



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### About the SUNRISE project

The SUNRISE project is part of the Investments for the Future of Biotechnology and Bioresources programs. With €21M in funding over 8 years, of which €7M is provided by the French National Research Agency (ANR), the project aims to develop new sunflower varieties with a better drought tolerance. The project includes a collaboration of nine public research laboratories (LIPM, AGIR, MIAT, CNRGV and LEREPS from Toulouse, EPGV and GQE from Versailles Grignon, BFP from Bordeaux and LBD from Paris), one technical center (Terres Inovia), five seed companies (Caussade Semences, Maisadour Semences, RAGT 2n, Soltis, Syngenta France), and one biotechnology company (Biogemma).



Visit the SUNRISE website: [www.sunrise-project.fr/](http://www.sunrise-project.fr/) Twitter: [https://twitter.com/SUNRISE\\_France](https://twitter.com/SUNRISE_France)

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