



PRESS RELEASE

THE GENOME OF BRASSICA NAPUS SUCCESSFULLY SEQUENCED

Évry (France), September 11th, 2014

On August 22nd, an international consortium of more than 30 institutes, under the direction of the Genopole laboratories Inra-URGV (Plant Genomics Research Unit) and Genoscope-CEA, and in association with the CNRS and the University of Évry-Val-d'Essonne, published in the international journal *Science* a references sequence of *Brassica napus*, the main oil crop plant in Europe.

Brassica napus is a major and strongly expanding crop plant. Known more commonly as rapeseed, the plant is mainly grown for its oil, which plays an important nutritional role for humans, derives a source of protein for farm animals, (oil cake) and represents a source of biofuel. It is a recent plant, resulting from the post-Neolithic hybridization of two species, *B. oleracea* and *B. rapa*, the genomes of which the modern plant still carries.

The decoding of the *B. napus* genome* is an unprecedented achievement: it is the first time that a polyploid genome has been sequenced in its entirety and compared to those of its parental genomes. The researchers observed that most of the *B. napus* genes exist in two copies with similar sequences. “*Contrary to many other plants, rapeseed has conserved almost all of the genes of its parent plants,*” explains Boulos Chalhoub, Head of the Organization and Evolution of Plant Genomes team at URGV and coordinator of the project. “*One gene copy maintains the primary classic function whereas the other can mutate for new functions.*”



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The sequence reveals the recurrent duplications that the *B. napus* genome has undergone during evolution, a process that manifests as a number of genes among the largest of all the organisms sequenced to date: the researchers identified 101,000 genes in *B. napus*, which is four times the number of genes found in the human genome (20 to 25,000).

This genetic wealth not only gives *B. napus* a high capacity for evolution and environmental adaptation but also makes the plant particularly suitable for agronomic improvements. For crop breeders, the plant has great potential for classic genetic enhancement. “*Through the knowledge that we've gained on the genome today and the identification of genes of interest that will come in the near future, we will be able to exploit the plant's potential more rapidly and efficiently to improve the crop's yield and the composition of its oil, as well as its resistance to disease and its use of nitrogen to limit pesticide and fertilizer use,*” predicts Chalhoub. This success is also interesting in fundamental terms as it provided an opportunity to better understand the origin and evolution of polyploid cultures.

* Seq-Poly-Nap project, finance primarily by the French National Research Agency.

Reference: Early allopolyploid evolution in the post-neolithic *Brassica napus* oilseed genome. *Science* 2014, Vol. 345 no. 6199 pp. 950-953. DOI: 10.1126/science.1253435

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About Genopole

Genopole is the leading French biopark dedicated to research in genetics and biotechnologies for healthcare and the environment. Genopole unites 19 research laboratories, 80 biotech companies and 21 technical platforms as well as university training programs (Évry-Val-d'Essonne University). Its objectives are to favor the development of research in genomics, post-genomics and other related fields, assure the transfer of resulting technology to the industrial sector, establish academic-level training programs for these fields, and finally to create and support biotech companies. Genopole is funded mainly by the Ile-de-France Regional Council (30%), the Essonne Department Council (26.5%) and the French State (15.7%).

www.genopole.fr

About the Organization and Evolution of Plant Genomes (OEGP) group / URGV

Since its creation in 1999, the OEGP group of the Plant Genomics Research Unit (URGV - Inra/CNRS/University of Évry) has been carrying out research to better understand the organization, evolution and functioning of polyploid plant genomes. The group was a pioneer in elucidating the initial molecular bases of genetic rearrangement induced by polyploidy and the specific chromosomal strategy of wheat. Also, since 2009, the OEGP group has been very active in the foundation and coordination of an international consortium for the sequencing of the species *Brassica napus*, contributing thus to the decoding of its parent species *B. rapa* and more recently *B. oleracea*. Today, with the publication of the first reference sequence of a recent polyploid genome (*B. napus*), the OEGP/URGV team is strengthening its position as a leader in polyploid plant genetics and genomics. This initial accomplishment provides guidance for the characterization of other polyploids so as to better understand this major diversification mechanism in the realm of plants. www.versailles.inra.fr/urgv - www.versailles.inra.fr/urgv/chalhoub.htm

About Genoscope

Created in 1997 and attached to the CEA in 2007, Genoscope is a center of reference for genomic sequencing and analysis. Comparative genomics in plants has been one a major objectives since the creation of Genoscope. Its participation in the sequencing of the genome of *Brassica napus* is one of a number of projects carried out in collaboration with other public scientific and technical research establishments that have led to the sequencing of a number of organisms in sectors with high economic interest, such as grapes, bananas and coffee. www.genoscope.cns.fr

About the University of Évry-Val-d'Essonne

The University of Évry-Val-d'Essonne (UEVE) is a multidisciplinary university created in 1991 as part of the development of higher education in the Ile-de-France administrative region. UEVE offers its approximately 10,000-strong student body more than 150 academic curricula, more than half of which are career-specific, in such fields as science, technology, law, economy & management, and social sciences. UEVE is also an important research hub, notably as concerns genomics, post-genomics and their application in healthcare. The university carries out its research activities in close collaboration with Genopole, the CNRS, Inserm and the CEA among others. www.univ-evry.fr