Wheat sequencing consortium is producing new tools for wheat breeders

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Credit: Flormond-Desprez

The International Wheat Genome Sequencing Consortium (IWGSC) announced today that it has started a new project to speed up gene discovery in bread wheat. It will provide plant breeders around the world with essential resources to accelerate their breeding programs and develop more sustainable wheat varieties with increased tolerance to biotic and abiotic stresses.

The project, funded by BayerCropScience and the French National Institute for Agricultural Research (INRA), is being coordinated by the IWGSC and involves the leaders of the wheat chromosome sequencing groups in 12 countries, the Institute of Experimental Botany in the Czech Republic, the French Plant Genomic Resource Centre (CNRGV) and KeyGene from The Netherlands.

The IWGSC will use the KeyGene Whole Genome Profiling (WGP) technology to generate new sequence information that will improve the quality and utility of physical maps for 15 chromosomes. WGP has proved to be a useful method for building high quality physical maps of complex genomes with a high fraction of repetitive regions – such as the wheat genome – that can then be used by breeders to better locate and clone genes and markers of interest.

Bayer CropScience's contribution is part of the company's commitment to support the achievement of a high quality wheat genome reference sequence by directly contributing to projects. "Bayer CropScience is excited to contribute to this project, which builds on our previous successful partnership with IWGSC. We are convinced that, on the path towards a full genome sequence, the new WGP data will create real value for public and private researchers by connecting genetic and physical maps," says John Jacobs, Expert Scientist at Bayer CropScience.

In the past year the IWGSC reached two milestones in its strategy towards delivering a high quality reference sequence of the bread wheat genome: the production of a chromosome-based draft sequence and the construction of physical maps for all of the chromosomes. The current project will help to link these two sets of resources ahead of the full reference sequence becoming available in 2018. It will also help fine-tune the current work on the reference sequence of each chromosome.

"These new resources will be invaluable for pseudomolecule construction, through assembly and anchoring, and ultimately for the achievement of a high quality reference sequence of the bread wheat genome", says Etienne Paux from INRA Genetics, Diversity and Ecophysiology of Cereals (INRA-GDEC) research unit in Clermont-Ferrand. "By co-funding this project, INRA reaffirms that sequencing the wheat genome is and remains one of the top priorities of French research."

The ultimate goal of the IWGSC is to generate a high quality, ordered, chromosome-based reference sequence of bread wheat. Concurrently with this new project, teams in 12 countries are working on reference sequencing of 14 of the 21 wheat chromosomes. The reference sequence of the largest chromosome (3B) was completed last year. The IWGSC is still seeking funding for reference sequencing of six wheat chromosomes. Provided that additional funding is secured soon, the IWGSC anticipates that a high-quality genome sequence for bread wheat could be publicly available by 2018.

Wheat is the most widely grown cereal crop in the world and the staple food for more than 35% of the global human population. It accounts for 20% of all calories consumed throughout the world. As the global population grows, so too does its dependence on wheat. To meet future demands of a projected world population of 9.6 billion by 2050, wheat productivity needs to increase by 1.6% each year. Since the availability of new land is limited to preserve biodiversity, and water and nutrient resources are becoming scarcer, the majority of this increase has to be achieved via crop and trait improvement on land currently cultivated. A high quality reference genome sequence would greatly contribute to achieving this goal.

Provided by International Wheat Genome Sequencing Consortium (IWGSC)