



ANNUAL REPORT

2021

INTERNATIONAL
WHEAT GENOME
SEQUENCING
CONSORTIUM



www.wheatgenome.org

MESSAGE FROM THE EXECUTIVE DIRECTOR

2021 was another year impacted by disruptions due to the COVID-19 pandemic, limiting our ability to travel and connect at meetings. Nevertheless, we were able to make progress in some of our activities and projects, providing more genomic tools and resources for the community.

This year, we focused our efforts on several activities: releasing new versions of the IWGSC Chinese spring reference sequence (IWGSC RefSeq) assembly and annotation; developing genomics tools for the wheat community; attempting to secure funding for the wheat diversity project; conducting our webinar series; and securing new sponsorships.

An updated version of the Chinese spring reference sequence (IWGSC RefSeq v2.1) was made available to the community in April. This new version integrates new datasets, resolves ambiguities, closes gaps, and increases the contiguity of the reference genome. To complement the new assembly, a new version of the annotation (IWGSC RefSeq Annotation v2.1) was also released, integrating manually curated genes submitted by the wheat community. Functional annotation of the reference is

a constant process, and we will continue to integrate manually curated genes received from the community into upcoming releases.

As part of our ongoing collaboration with Daicel Arbor Biosciences, a promoter capture array was developed and made available in early 2022. Our goal for the coming years is to expand our collaborations with wheat genomic tool developers to provide the wheat community with useful resources and tools.

Unfortunately, we did not make much progress in the IWGSC Wheat Diversity project aimed at sequencing at least eight landraces which characterize the breadth of genetic diversity in bread wheat. In this project, the genomes of eight to twelve landraces, representing the full breadth of genetic diversity in wheat, will be sequenced at high quality, as well as an updated, platinum quality sequence of



We look forward to working with all of you in the coming years to continue developing tools and resources for the wheat community.

the same cultivar used in RefSeq v1. Lower quality genome sequences of other landraces and elite lines will be added as available. We will continue to seek collaborators, partners, and funding for the project in 2022.

The IWGSC Webinar series continued to be very popular in the wheat community. We organized twelve webinars in 2021 and received very good feedback from around the world.

In 2021, marking an expansion of our focus from fundamental genome sequencing to more direct application to wheat improvement, five new members joined the Board of Directors: Chris Burt (RAGT Seeds), Pierre Devaux (Florimond Desprez), John Jacobs (BASF), Yann Manès (Syngenta), and Pierre Sourdille (INRAE). Their leadership and vision are a great addition to the Board and we welcome their input on strategies and priorities for the IWGSC Phase II activities in the coming years.

We were also pleased to welcome three new sponsors this year: two companies that develop genomics tools – Illumina and Curio Genomics – and CIMMYT, the well known international agricultural

research and training organization. They joined Daicel Arbor Biosciences, BASF, Florimond Desprez, INRAE, the Kansas Wheat Commission, RAGT, and Syngenta in financially supporting the IWGSC.

Sponsors are essential to the IWGSC as they not only make the day-to-day management of the Consortium possible by their financial support, but they also actively participate in IWGSC-led projects and help shape the IWGSC priorities, strategic plans, and activities. We look forward to working with all of them in the coming years to continue developing tools and resources for the wheat community.

We hope that 2022 will offer our community a chance to reconvene, increase collaborations, and accelerate wheat improvement as improved vaccines provide more immunity to the coronavirus.

We look forward to seeing you in person at one of the meetings this year or in early 2023!

Kellye Eversole
*IWGSC Executive Director &
Chair of the Board*

ABOUT THE IWGSC

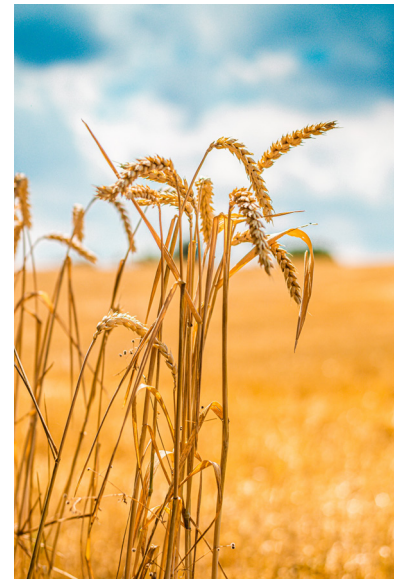
The IWGSC is an international, collaborative consortium, established in 2005 by a group of wheat growers, plant scientists, and public and private breeders.

The IWGSC provides tools and resources that serve as a foundation for the accelerated development of improved varieties and that empowers all aspects of basic and applied wheat science.

The IWGSC is a 501(c)(3) nonprofit organization registered in the United States.

VISION

Enhance wheat breeding through an increased understanding of the molecular basis of traits and their allelic diversity



GOALS

- ➔ Lay a foundation to accelerate wheat improvement
- ➔ Increase profitability throughout the industry

IWGSC 2.0

Following the publication of the reference sequence of the bread wheat genome, IWGSC RefSeq v1.0, in the journal *Science* in August 2018, the IWGSC moved into Phase II and focuses its efforts on:



IWGSC Gold Standard reference sequence

Gap filling and integration of manual and functional annotation to IWGSC RefSeq assembly.



Genomics tools

Development of tools for the community such as exome array, promotor capture panel, and other resources.



IWGSC Diversity project

Characterization of the breadth of worldwide wheat diversity.

DATA REPOSITORY



All IWGSC RefSeq, RefSeq annotation and associated resources are publicly available at the IWGSC data repository at URGI-INRAE Versailles, France, at <https://wheat-urgi.versailles.inra.fr>

The data are also available at Ensembl Plants, Graingenes and WheatIS.

The latest versions of IWGSC RefSeq assembly and annotation are versions 2.1.

IWGSC BOARD

The Board establishes the overall vision and mission of the Consortium and ensures the implementation of the strategic decisions made by the Coordinating Committee, a group comprised of 58 representatives of universities, research institutions, governmental agencies, and grower organizations, as well as small, medium, and large wheat breeding and seed companies.



Rudi Appels
University of Melbourne &
Agribio, Australia



Ute Bauman
University of Adelaide,
Australia



Hikmet Budak
Montana BioAg Inc., USA



Chris Burt
RAGT, United Kingdom



Pierre Devaux
Florimond Desprez, France



Kellye Eversole
Chair of the Board of Directors
and IWGSC Executive Director



John Jacobs
BASF, Belgium

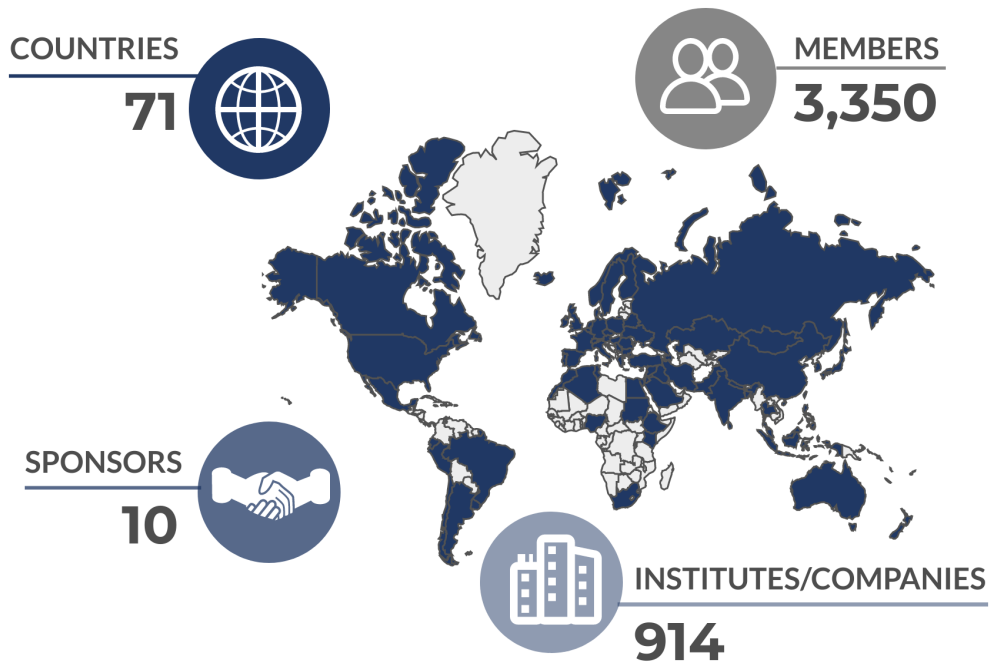


Yann Manès
Syngenta, France



Pierre Sourdille
INRAE, France

2021 IN NUMBERS



WEBSITE

63,860 page views
19,290 users
30,080 visits



DATA REPOSITORY

30,250 visits
36,310 downloads
94,920 BLASTs



WEBINARS

12 webinars
4,481 registrations from **86** countries
7,128 YouTube views



TWITTER

113 tweets
221,000 impressions
2,425 followers (+350)

2021 HIGHLIGHTS

REFERENCE SEQUENCE AND ANNOTATION v2.1

IWGSC RefSeq v2.1 has been completed under the leadership of Mingcheng Luo and Jan Dvorak (UC Davis, CA, USA) and with funding from the US National Science Foundation and the USDA Agricultural Research Service CRIS. IWGSC RefSeq v1.0 was revised using whole genome optical maps and contigs assembled from whole-genome-shotgun (WGS) PacBio SMRT reads. The revisions involved approximately 10% sequence length of the IWGSC RefSeq v1.0.

The revised genome assembly has been annotated (Annotation v2.1) by Frédéric Choulet and H  l  ne Rimb  rt (INRAE, GDEC, France) with funding from the French Government managed by the Research National Agency (ANR) under the Investment for the Future program (BreedWheat). The new annotation integrates functional and manual annotation, as well as alignment with other genomic resources, it also incorporates manually curated genes submitted from the wheat community. IWGSC Annotation

v2.1 contains 266,753 genes, comprising 106,913 HC genes and 159,840 LC genes.

Both RefSeq v2.1 and Annotation v2.1 were released to the community in April 2021.

An article outlining these new resources and the improvements to the wheat reference sequence has been published in *The Plant Journal* and is available on open access.

Reference

Zhu, T., Wang, L., Rimb  rt, H., Rodriguez, J.C., Deal, K.R., De Oliveira, R., Choulet, F., Keeble-Gagn  re, G., Tibbits, J., Rogers, J., Eversole, K., Appels, R., Gu, Y.Q., Mascher, M., Dvorak, J. and Luo, M.-C. (2021), Optical maps refine the bread wheat *Triticum aestivum* cv Chinese Spring genome assembly. *The Plant Journal*.
<https://doi.org/10.1111/tpj.15289>

2021 HIGHLIGHTS

GENOMICS TOOLS

The IWGSC is committed to helping develop genomic resources useful for the wheat community and is continuously discussing opportunities with service providers.

A target capture panel for promoters and other regulatory elements in wheat was developed under the leadership of

Jorge Dubcovsky (University of California, Davis, USA) and Jacob Enk (Daicel Arbor Biosciences), in collaboration with researchers from INRAE (France). The panel is designed to capture ~168 Mbp of genomic space as measured on RefSeq v1.0. The kit became available in January 2022.

DIVERSITY PROJECT

In 2021, the IWGSC leadership worked on putting together a team and securing funding for the wheat diversity project. Under this project, the IWGSC plans to develop platinum quality sequences of a core set of eight landraces and to add to these data elite and founder lines sequenced to varying levels of quality, as well as publicly available sequences.

WEBINARS

A total of twelve webinars were organized, of which two in collaboration with the Phytobiomes Alliance and one in collaboration with the Women in Genomics network.



FINANCES

The IWGSC is financially supported by sponsors – private companies, research institutions, and grower organizations.

RESOURCES



EXPENSES



SPONSORS



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I W G S C



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