A high quality chromosome-based reference sequence for hexaploid bread wheat

Wheat Initiative Associated Programme update

Jane Rogers

Deputy Director, IWGSC

4 June 2015

The IWGSC

21 sponsors
1,450 members and data users
417 institutes / companies
60 countries

Board of Directors

Role: Overall strategy and organization

4 Permanent Directors: Appels, Eversole, Feuillet, & Keller

5-10 Non-Permanent Directors (including at least 1 Outside Director)

Leadership Team

Role: Daily management

Members: Appels, Eversole, Feuillet, Keller, & Rogers

Coordinating Committee

Role: Scientific strategy

Members: Sponsors & Leaders of IWGSC Projects & Initiatives

Members

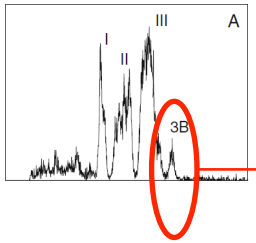
Role: Participation & Input

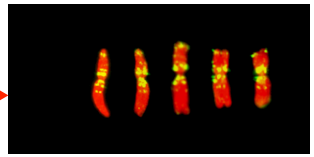
Members: Open to Anyone

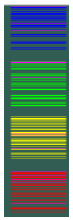
IWGSC 2015

IWGSC Strategy for a Reference Wheat Genome

1. Flow-sorted wheat chromosome BAC library construction
2. BAC fingerprinting (HICF/WGP)
3. Contig assembly by FPC/LTC
4. MTP sequencing /Scaffold assembly
5. Pseudomolecule construction (meiotic/LD/RH mapping)
6. Automated and curated annotation







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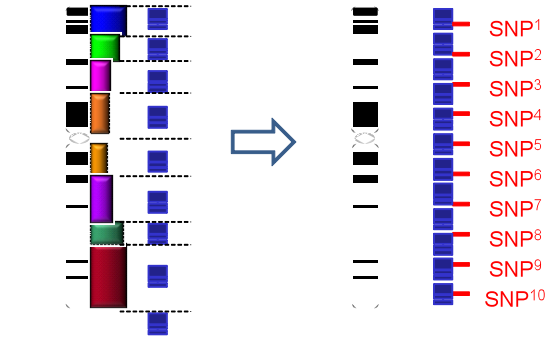


IWGSC Std

21

21

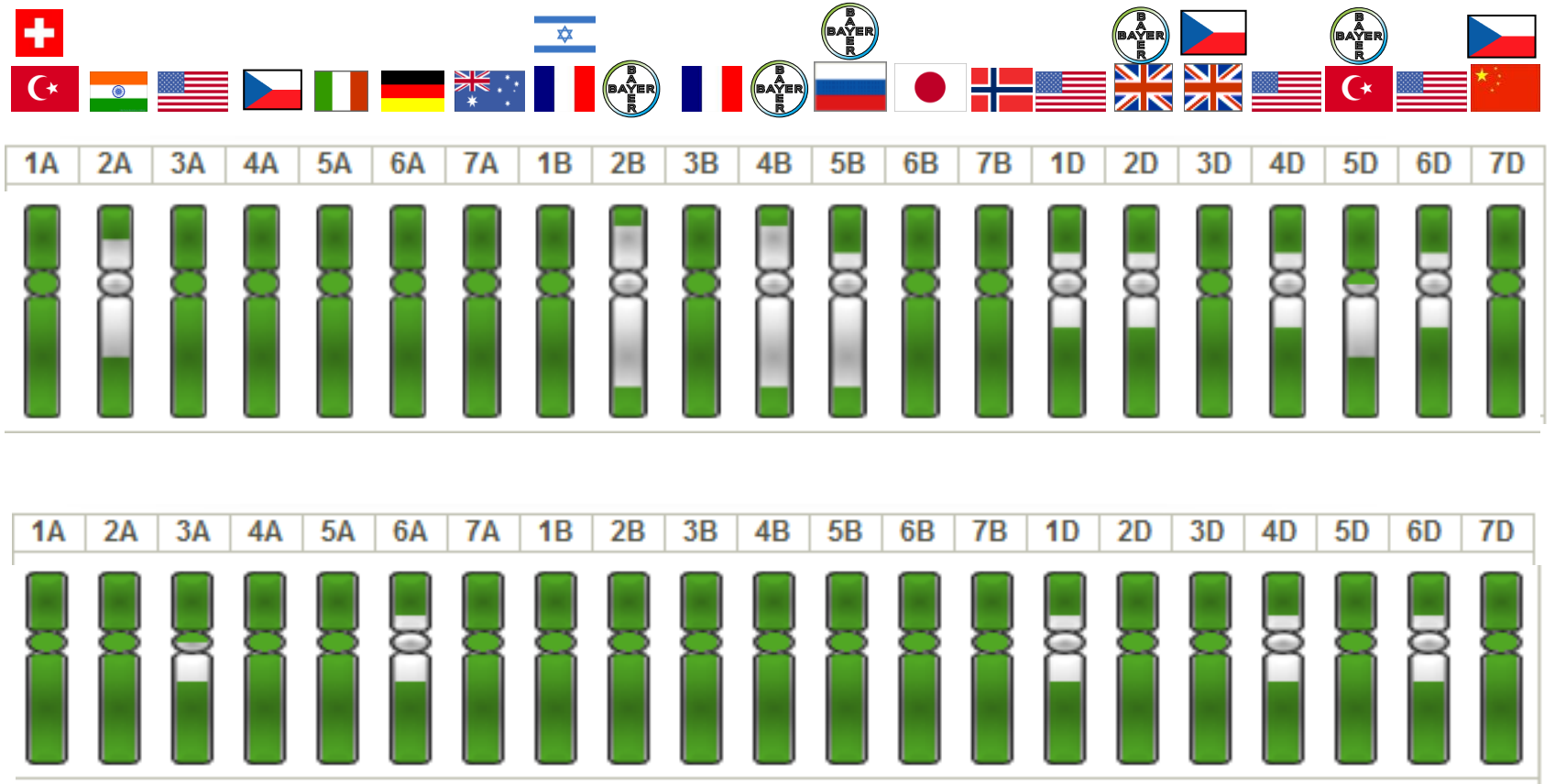
16

7.5

3

1

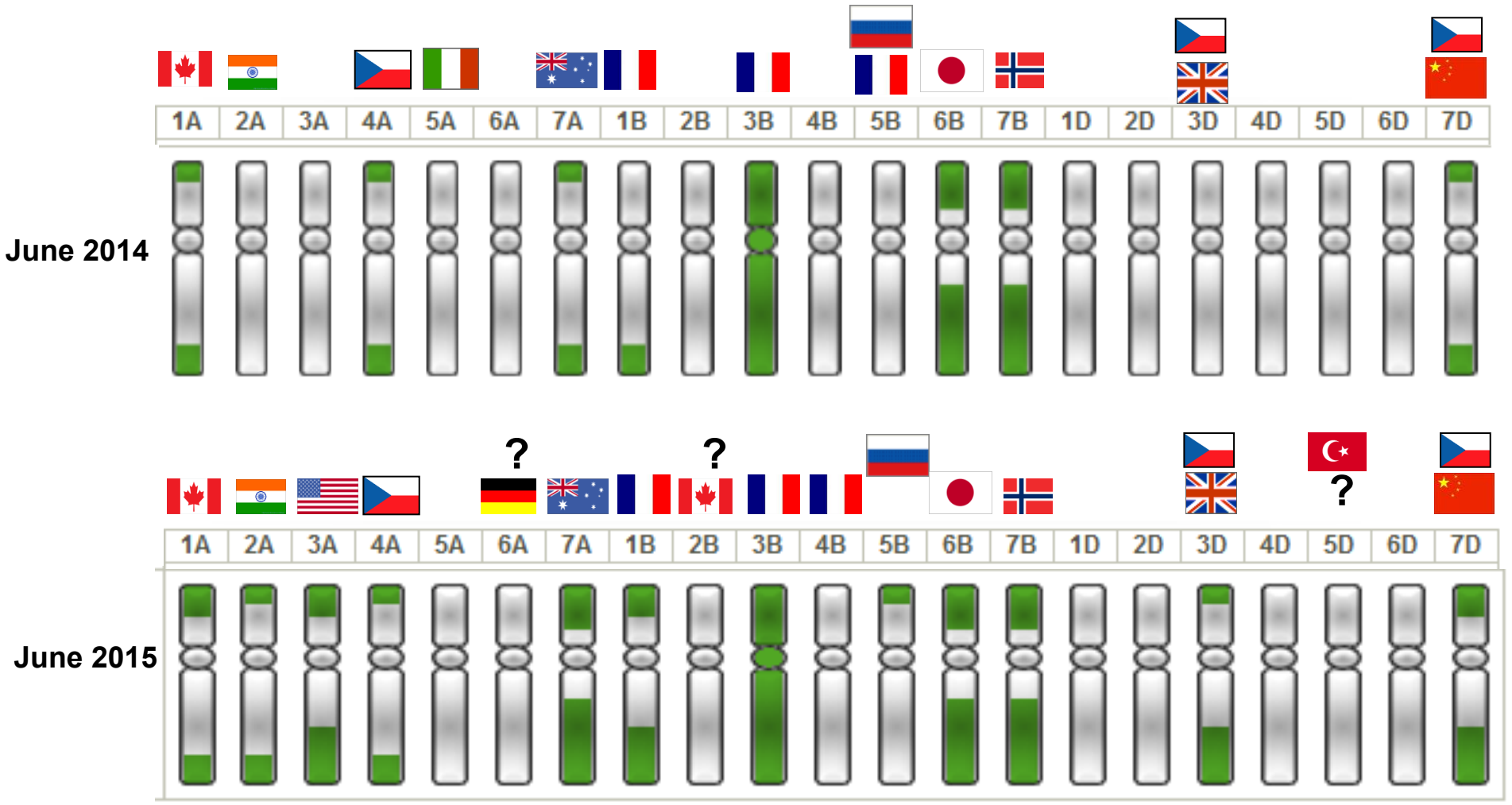
Wheat Chromosome Physical Maps



Physical maps have been constructed for all chromosomes.
5 maps are considered drafts and are being improved.

Status reports from IWGSC website

Wheat Chromosome Reference Sequencing

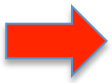


? **Funding decision pending**

Wheat Chromosome Reference Sequencing

NEW DEVELOPMENTS

- Use of Illumina high throughput long reads (300bp / 500bp PE) to improve primary sequence assemblies
- Use of mate pair data – from pooled BACs and whole genome data (A. Sharpe, C. Pozniak) to improve contig ordering and joining
- Integration of physical map and sequence data with LTC
- Sharing of mapped marker data (e.g. INRA-GDEC CS-Renan population data, CSIRO MAGIC data)
- Pilot projects on long read technologies (PacBio, Oxford Nanopore)
- BioNanogenomics chromosome mapping for QC and improvement of pseudomolecule assemblies (J. Dolozel, IEB, V. Barbe, Genoscope)
- Sharing of data and information between groups via monthly calls coordinated by IWGSC



IMPROVED SEQUENCE QUALITY ACROSS THE GENOME

Funding plans and opportunities

- The IWGSC continues to work with groups in individual countries and support funding applications that include chromosome sequencing as a component of a grant proposal, e.g.
  - 4B project funded in France
  - proposals under consideration in Canada (2B), Turkey (5DL), Germany (6A)
- Exploring opportunities with industry, following the model of Bayer Crop Sciences funding of the physical maps of 2B, 4B, 2D, 5BL, 5DL
- Exploring opportunities in the EU and elsewhere

Future plans

- Secure funding to complete the project and achieve a uniform high sequence quality across the genome
  ~ Eu 11.5 M

- Continue to work with chromosome leaders, IEB, INRA CNRGV, and URGI to make clone and data resources accessible

- Develop plan to capture ongoing sequence improvement, annotation and data integration to improve utility to breeders and other users

Acknowledgements

- IWGSC Leadership Team:
  Rudi Appels, Murdoch University
  Kellye Eversole, IWGSC
  Catherine Feuillet, (INRA)–Bayer CropScience
  Beat Keller, University of Zurich
  Jane Rogers, IWGSC

- 63 members of the Coordinating Committee

- Physical mapping and sequencing project leaders in 19 countries, their team members, and collaborators