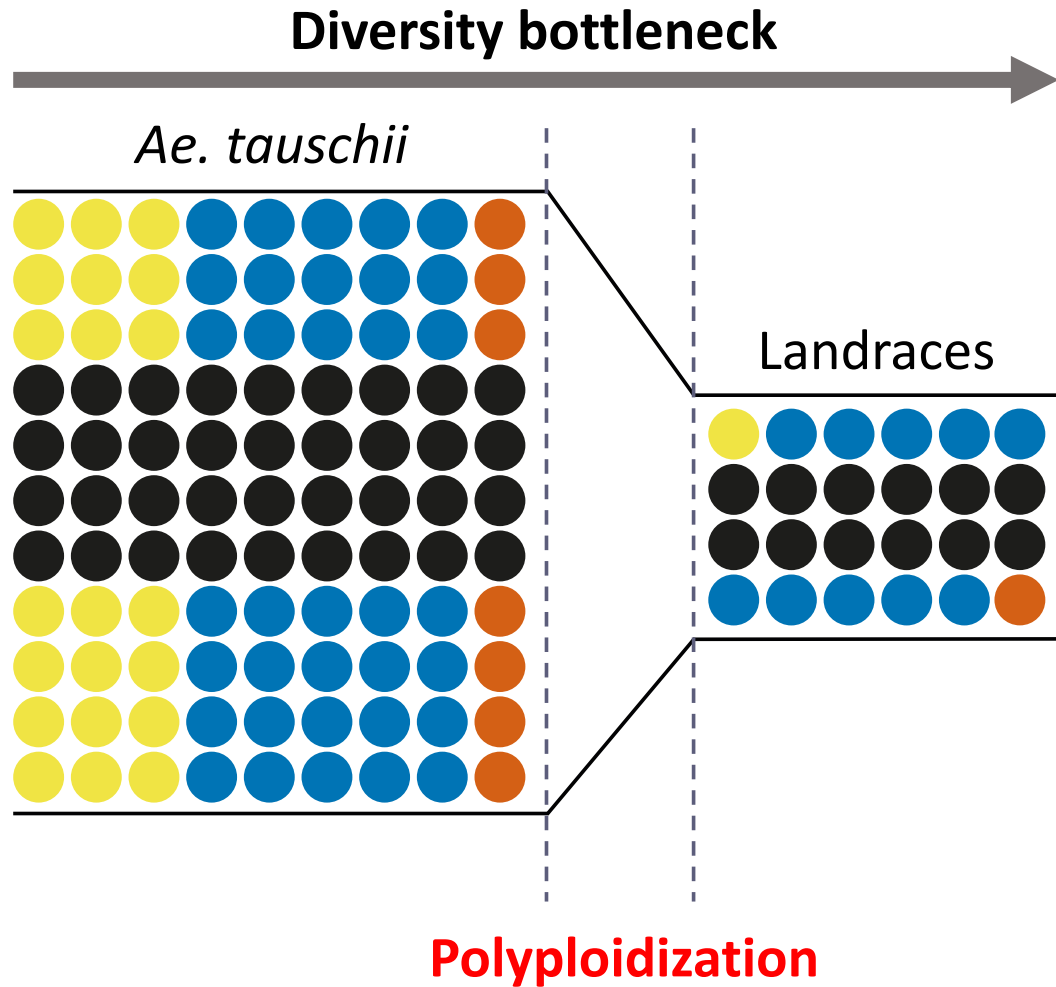


Past evolution & future enrichment
of the wheat D-subgenome
from *Aegilops tauschii*

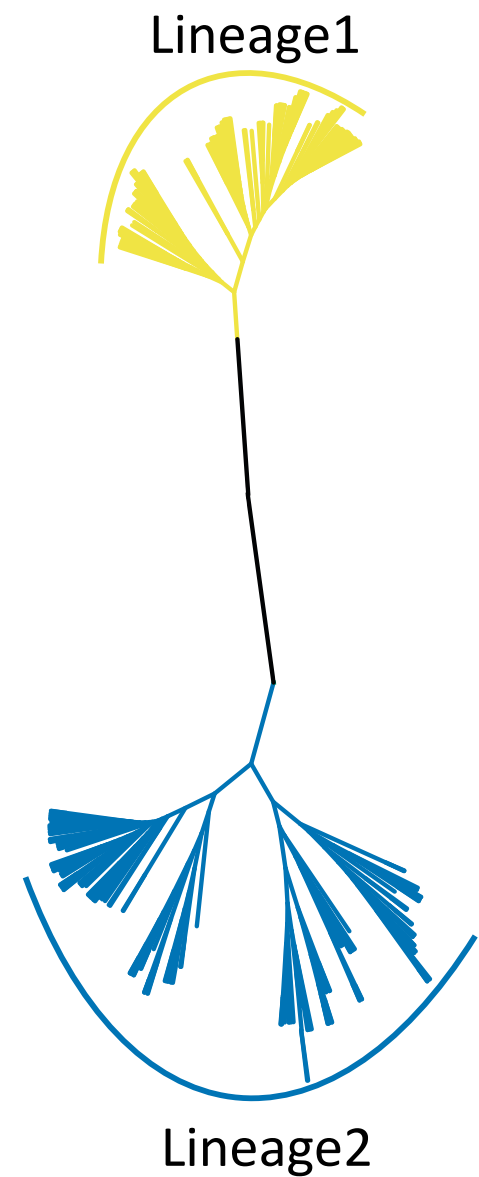
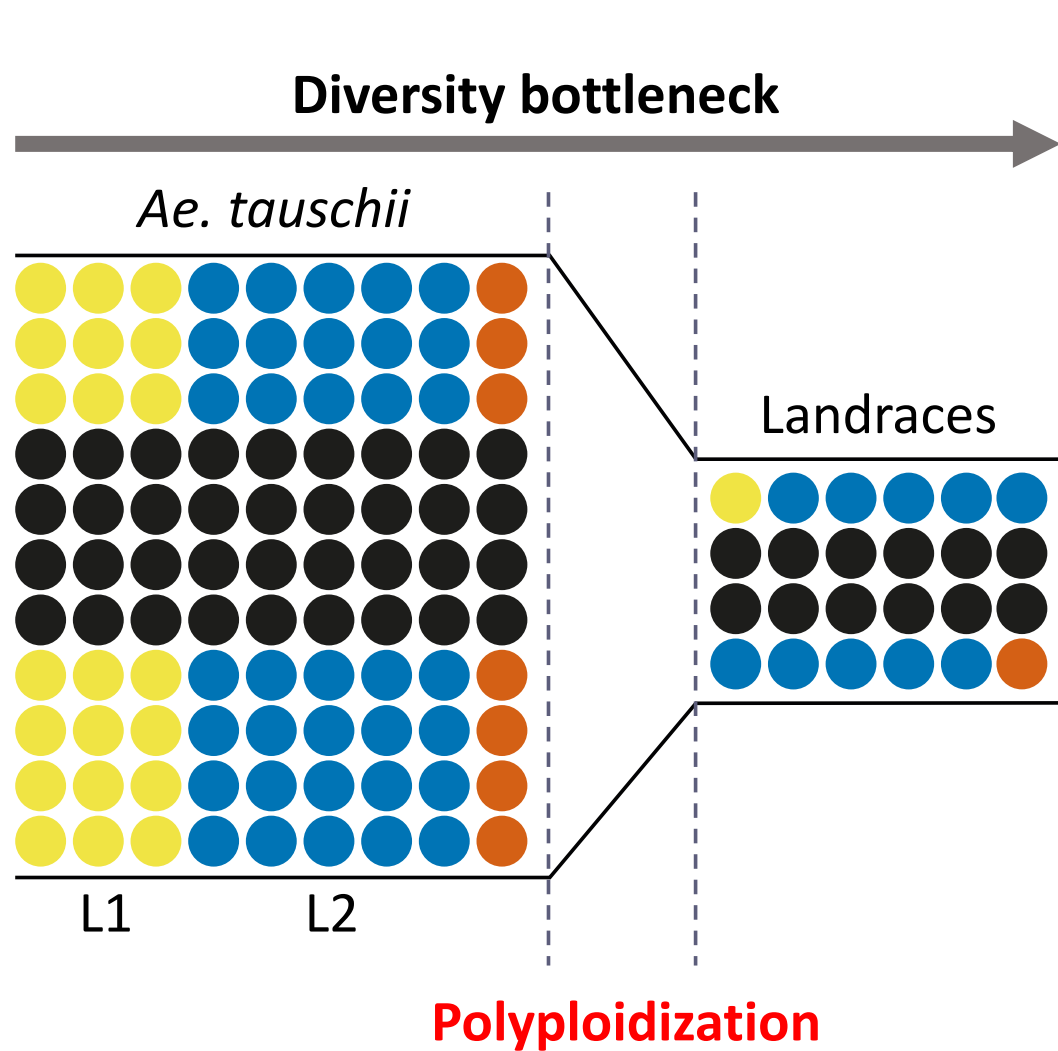
Sanu Arora
John Innes Centre



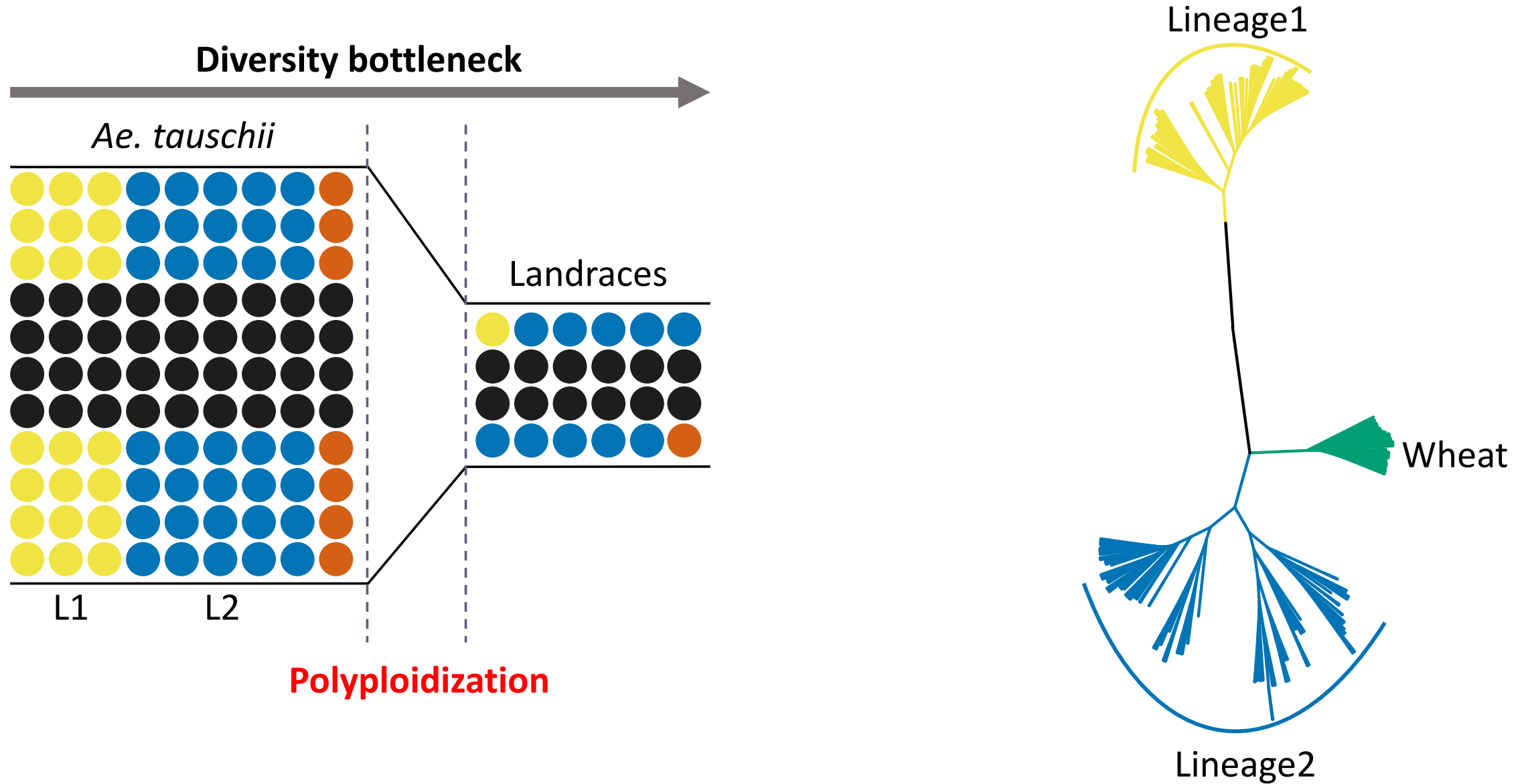
Aegilops tauschii vs wheat D-subgenome diversity



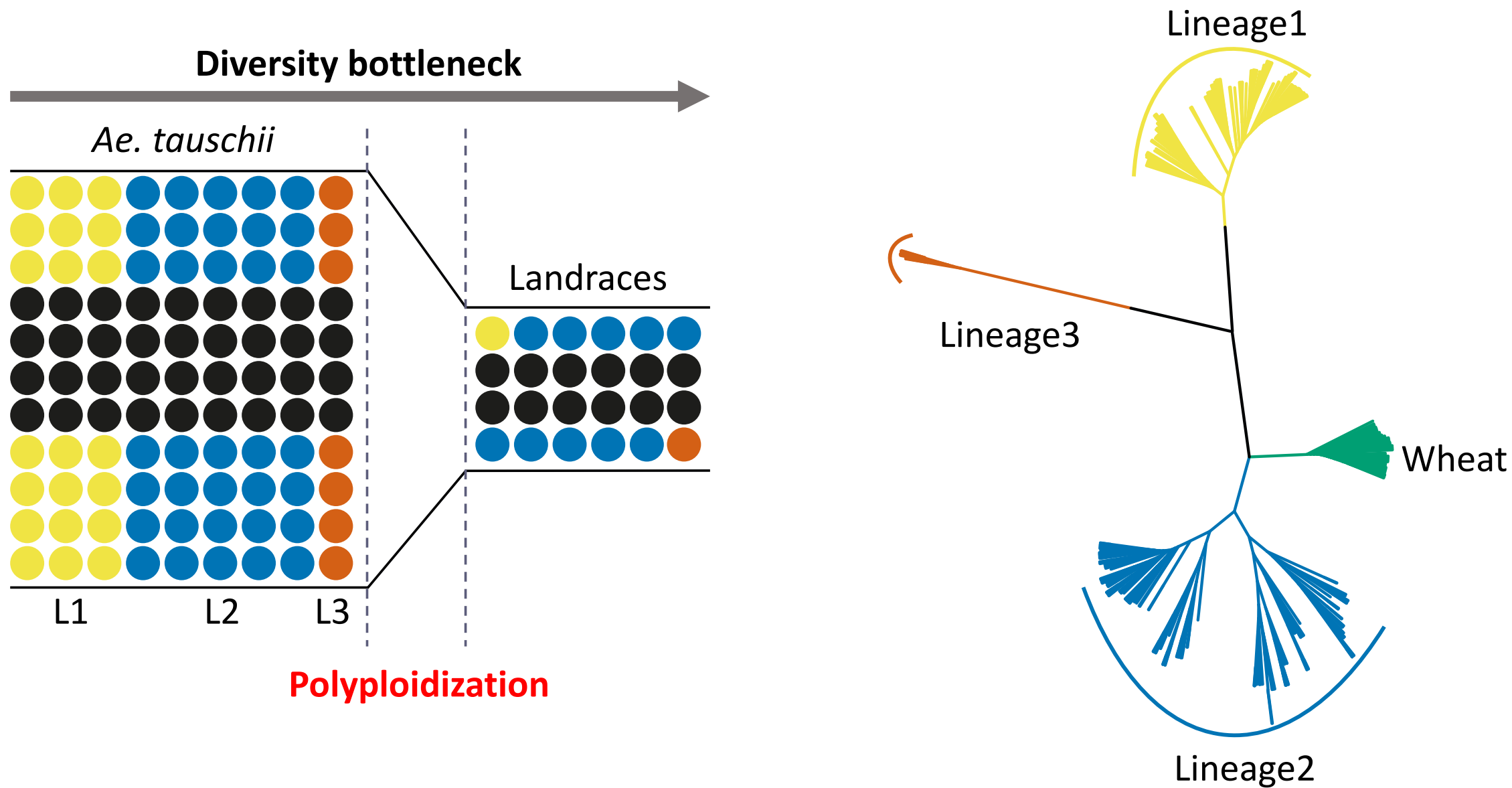
Aegilops tauschii vs wheat D-subgenome diversity



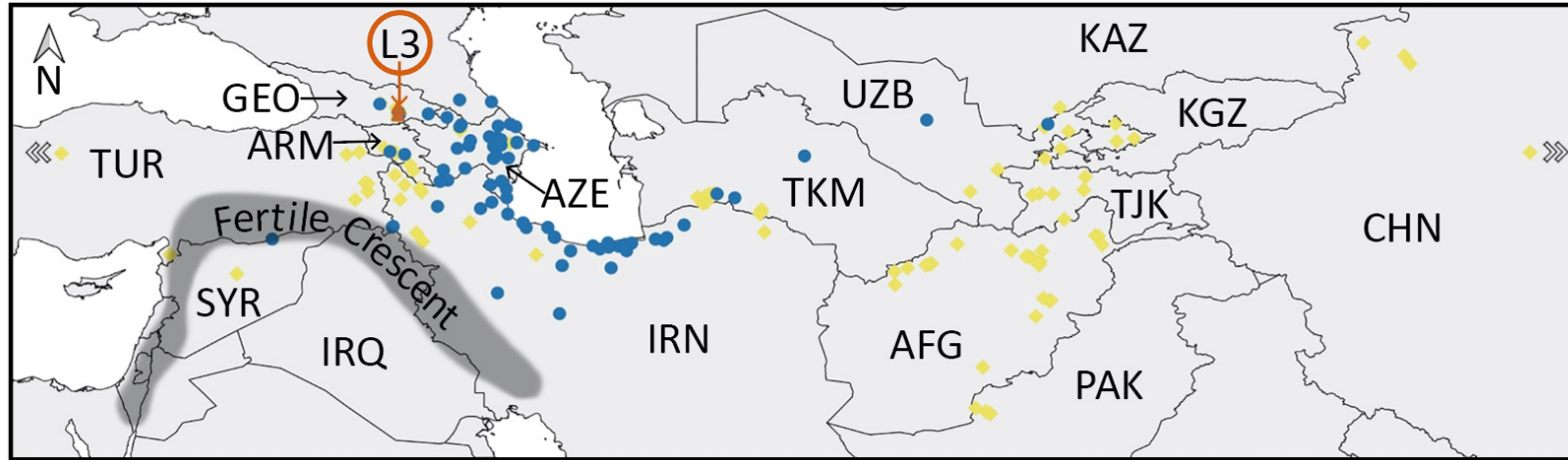
Aegilops tauschii vs wheat D-subgenome diversity



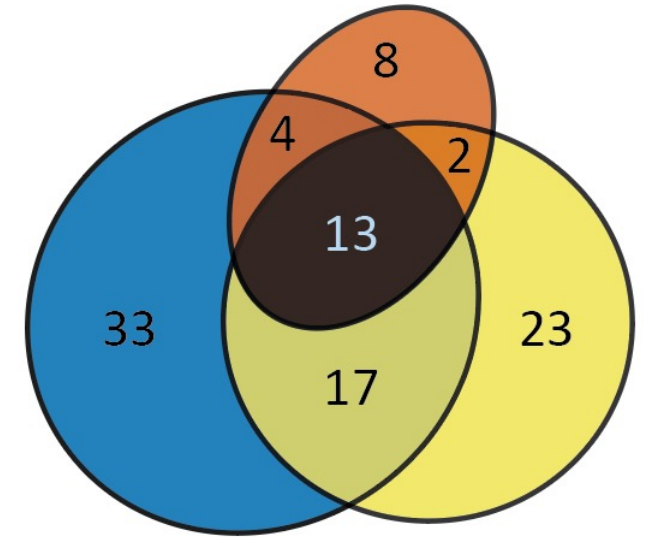
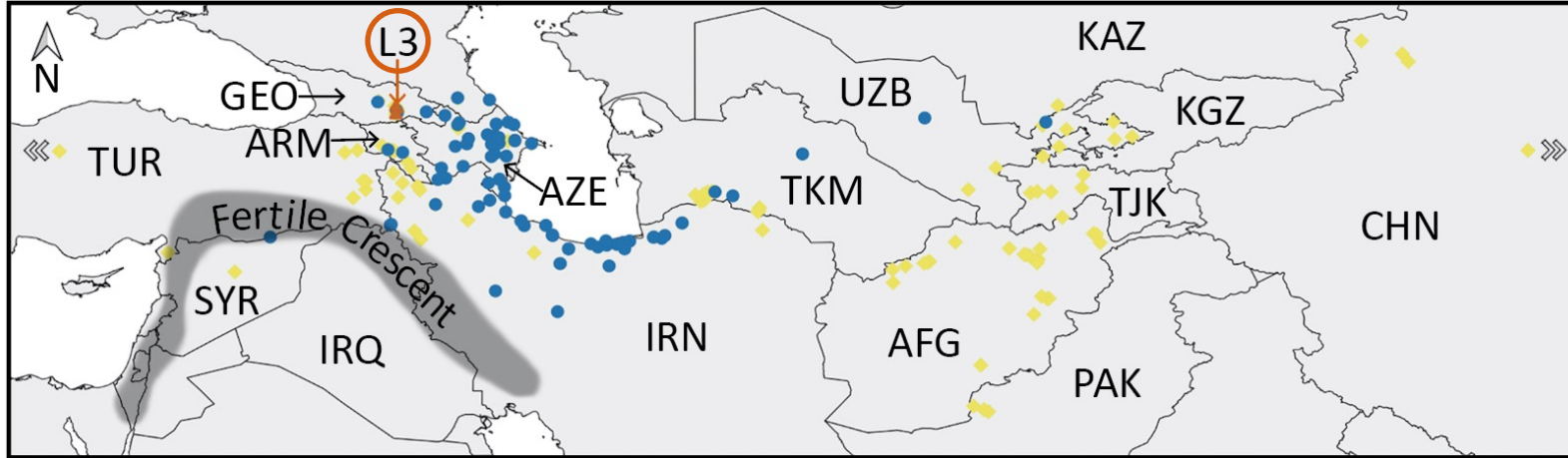
A third *Ae. tauschii* lineage!!



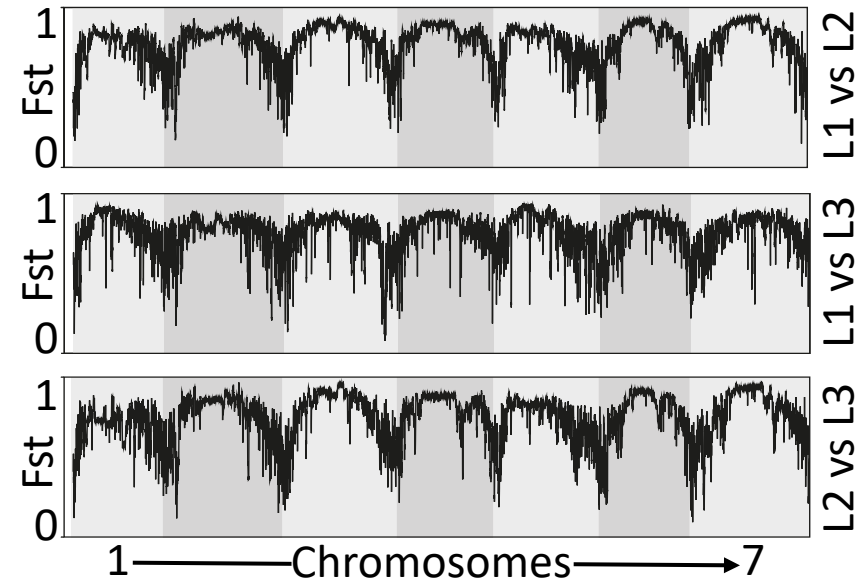
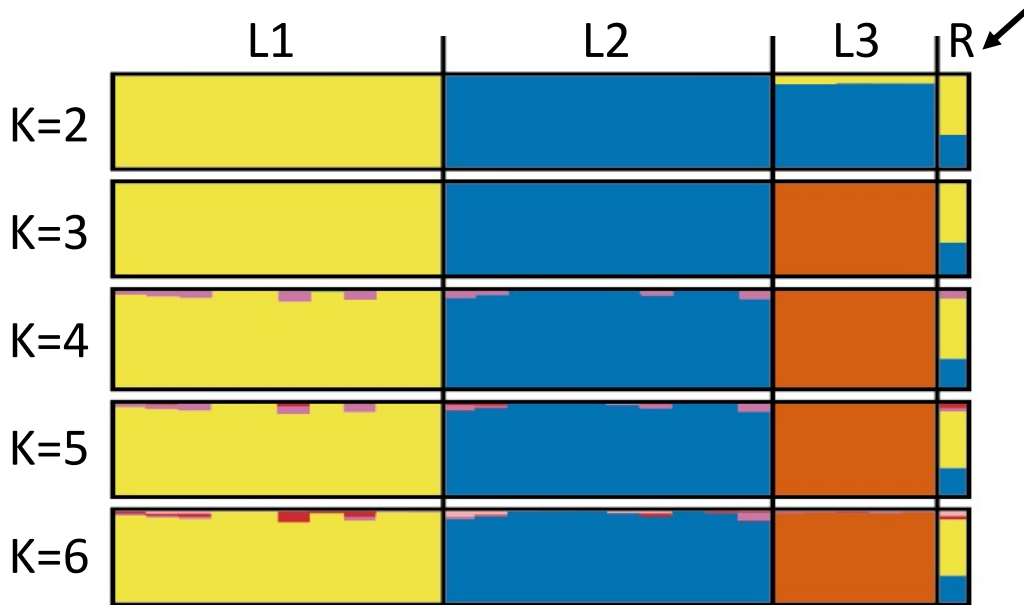
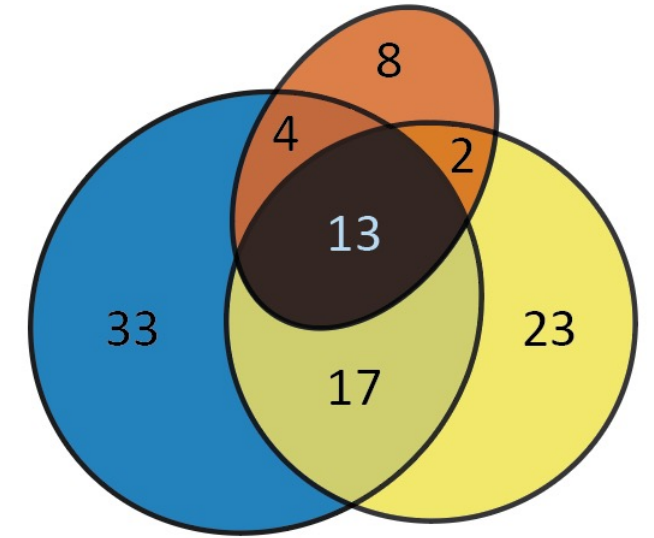
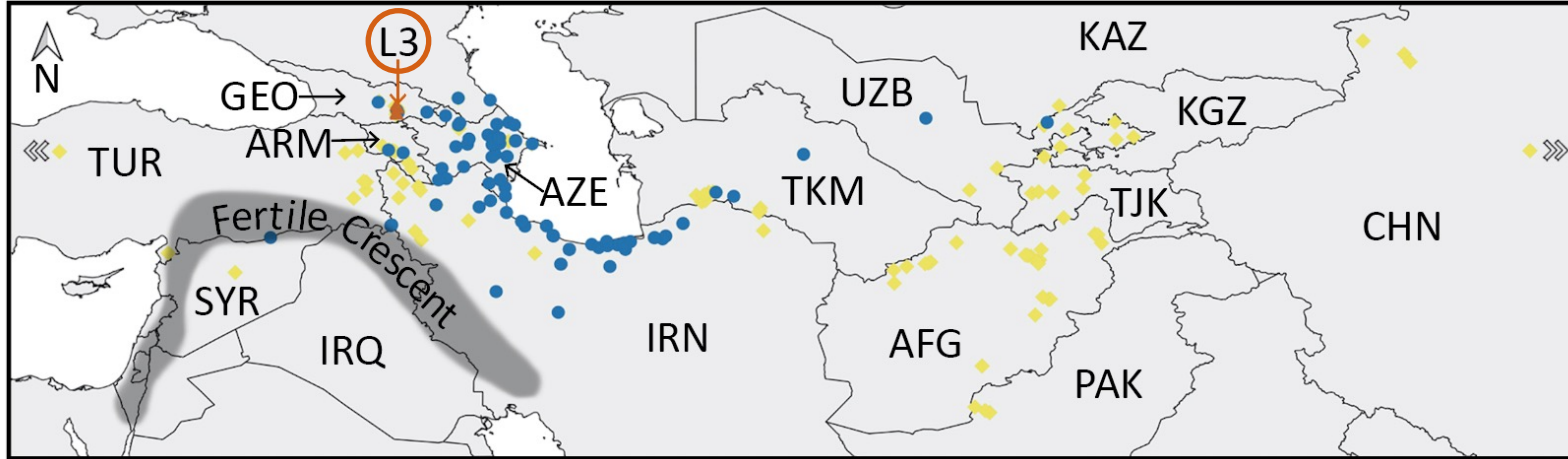
Characterization of the Lineage 3



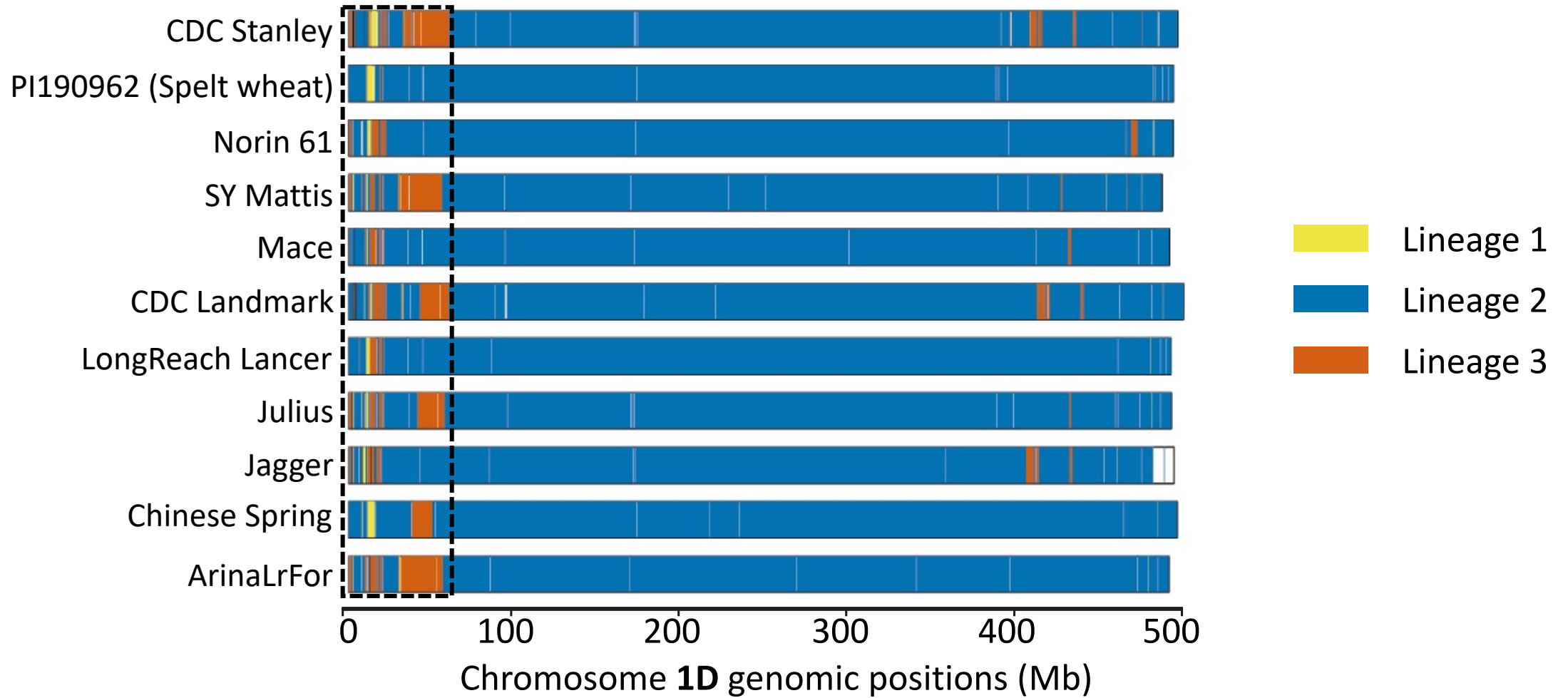
Characterization of the Lineage 3

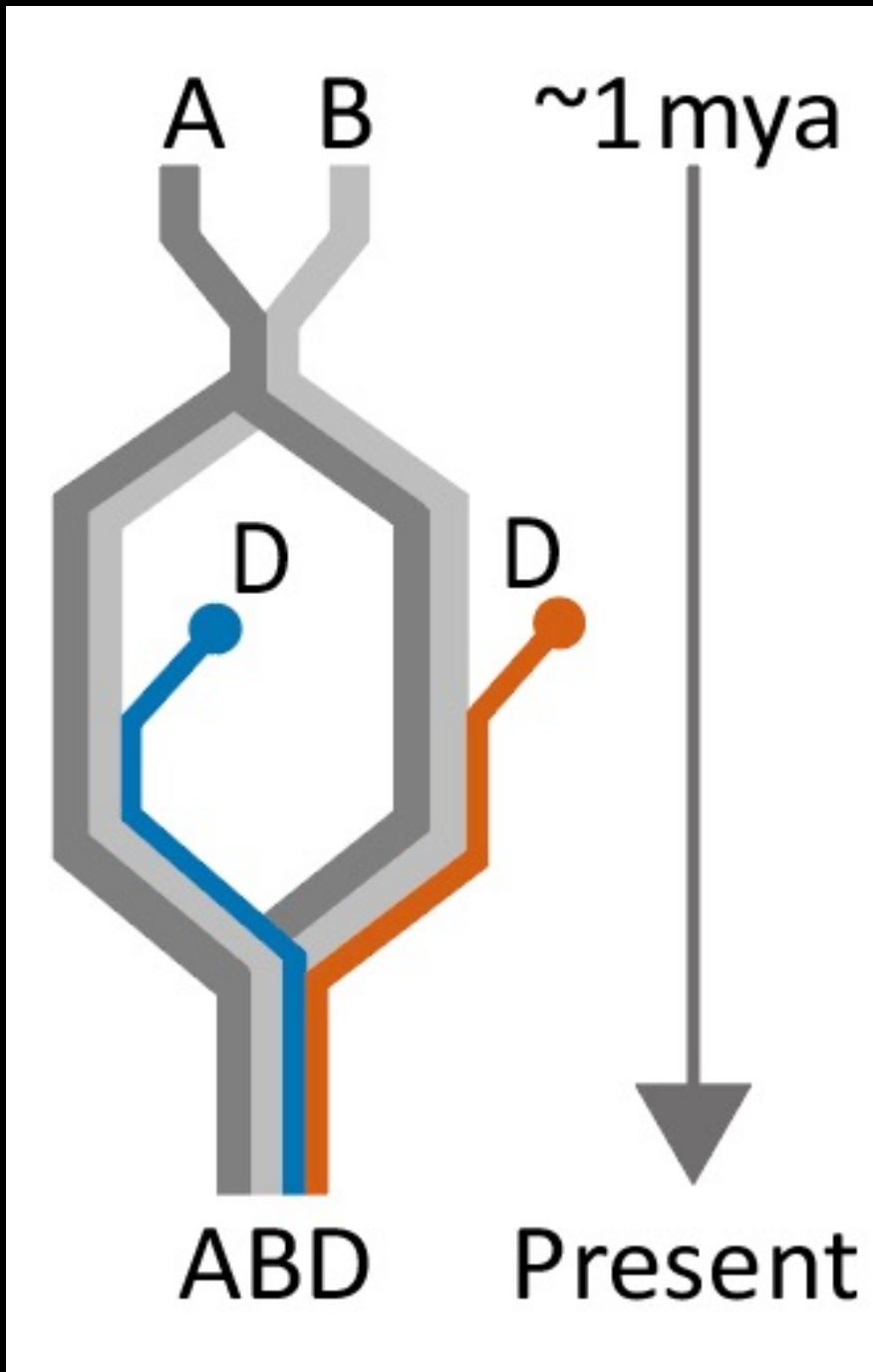


Characterization of the Lineage 3



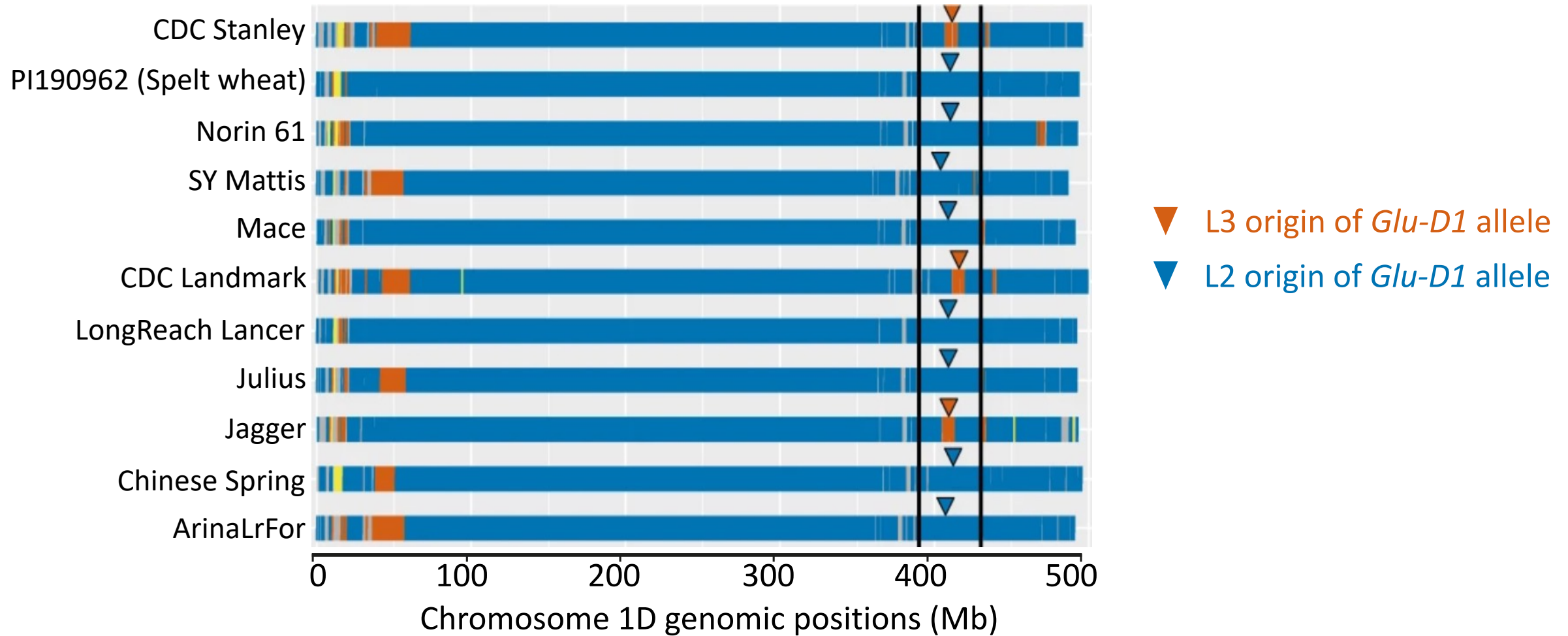
Distinct signature of *Ae. tauschii* lineages in wheat



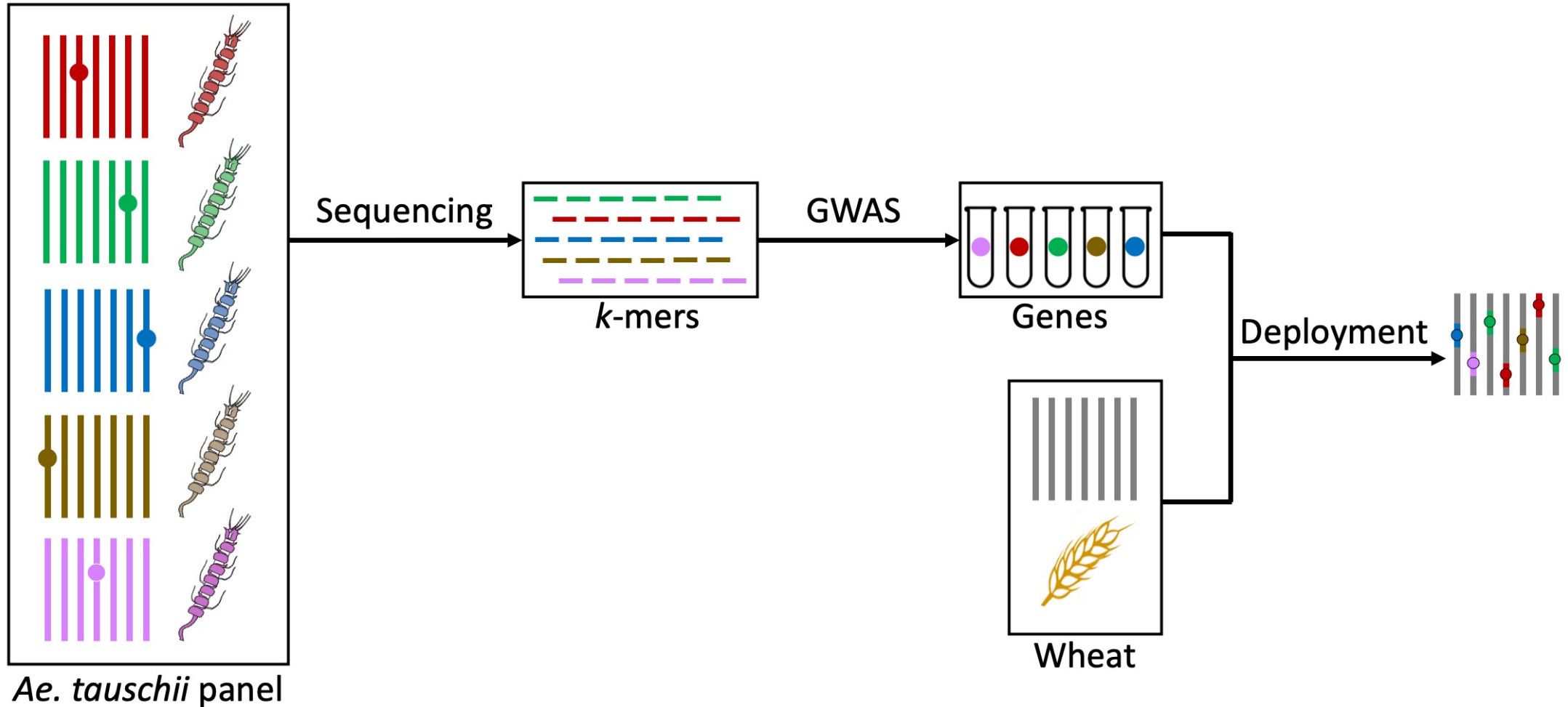


The multiple hybridization hypothesis

L3 is the source of superior *Glu-D1* allele in wheat



Using association genetics to exploit progenitor diversity

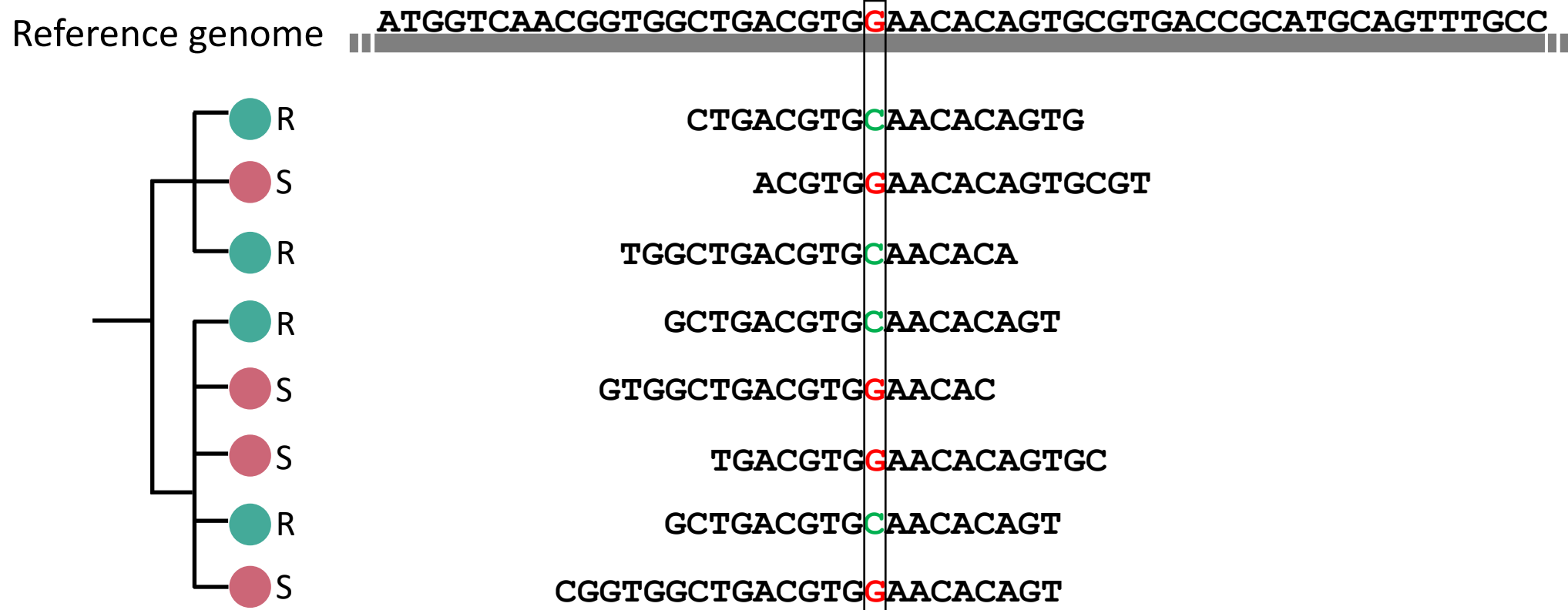


Reference-based association mapping

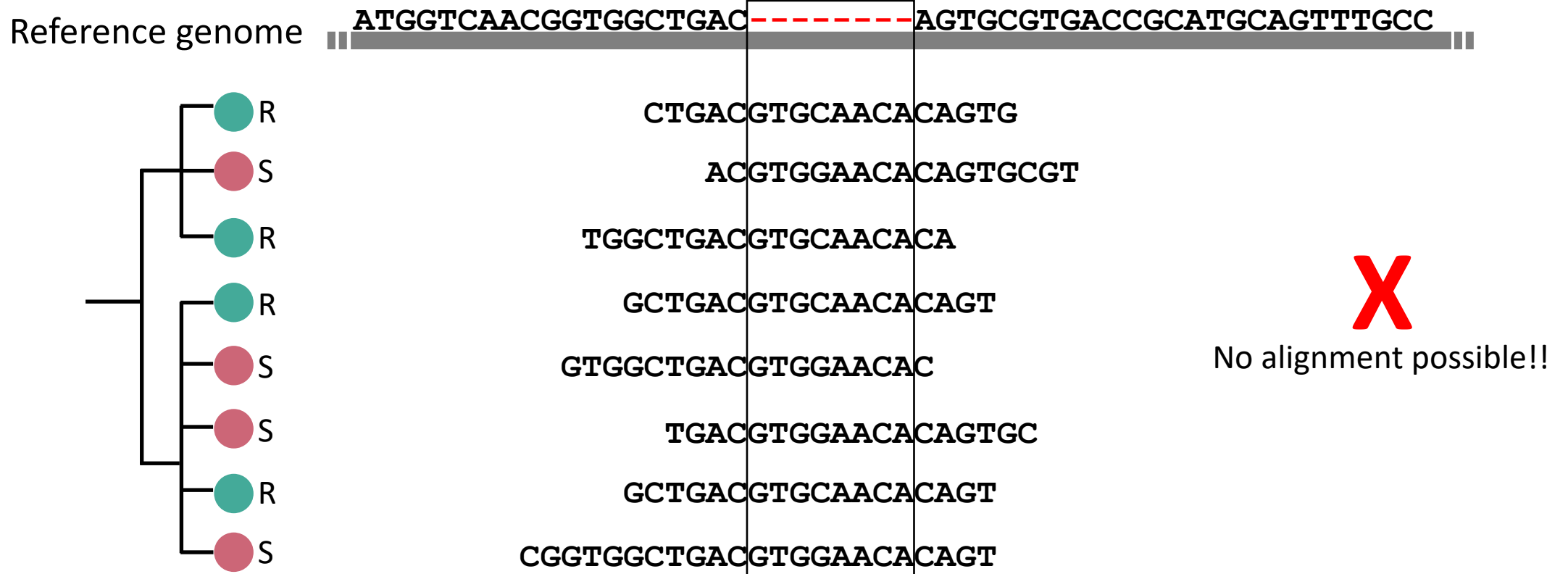
Reference genome **ATGGTCAACGGTGGCTGACGTGGAACACAGTGCGTGACCGCATGCAGTTTGCC**



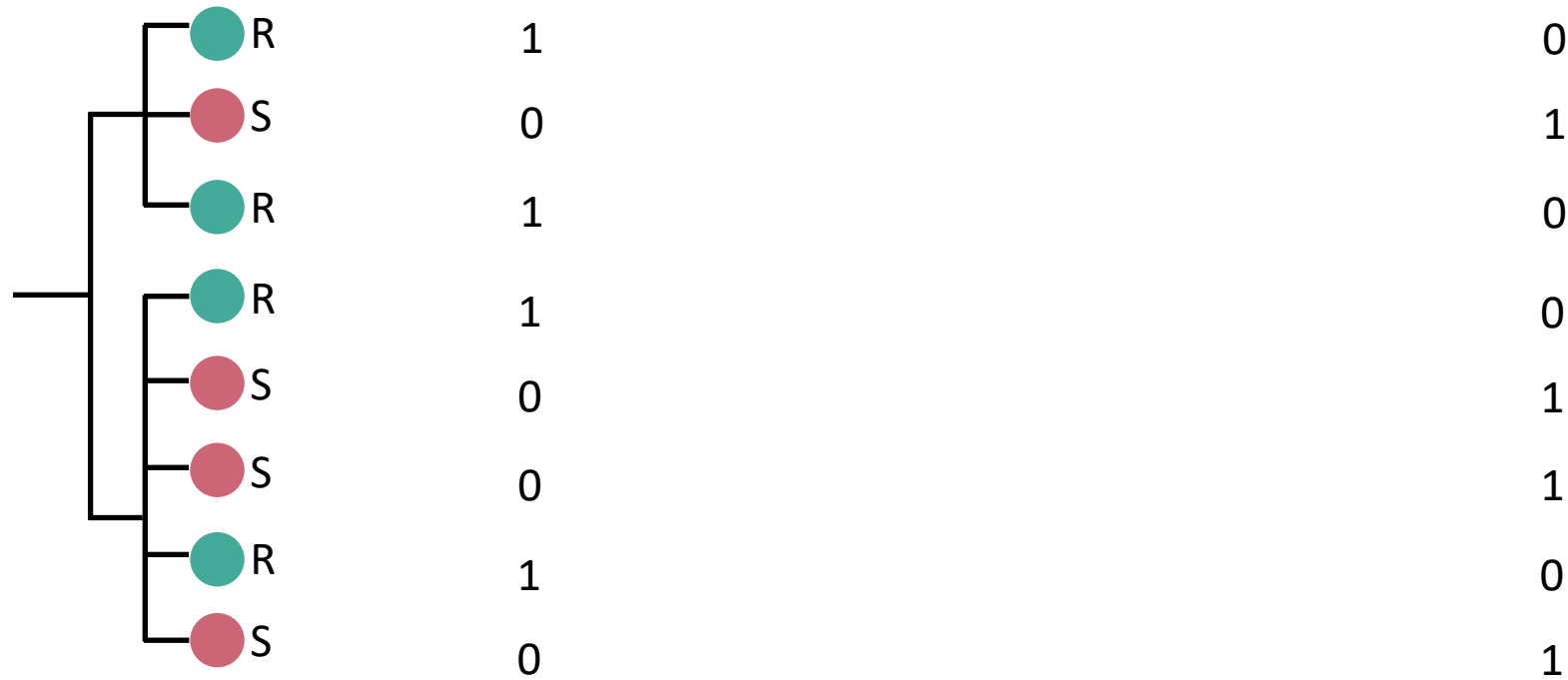
Reference-based association mapping



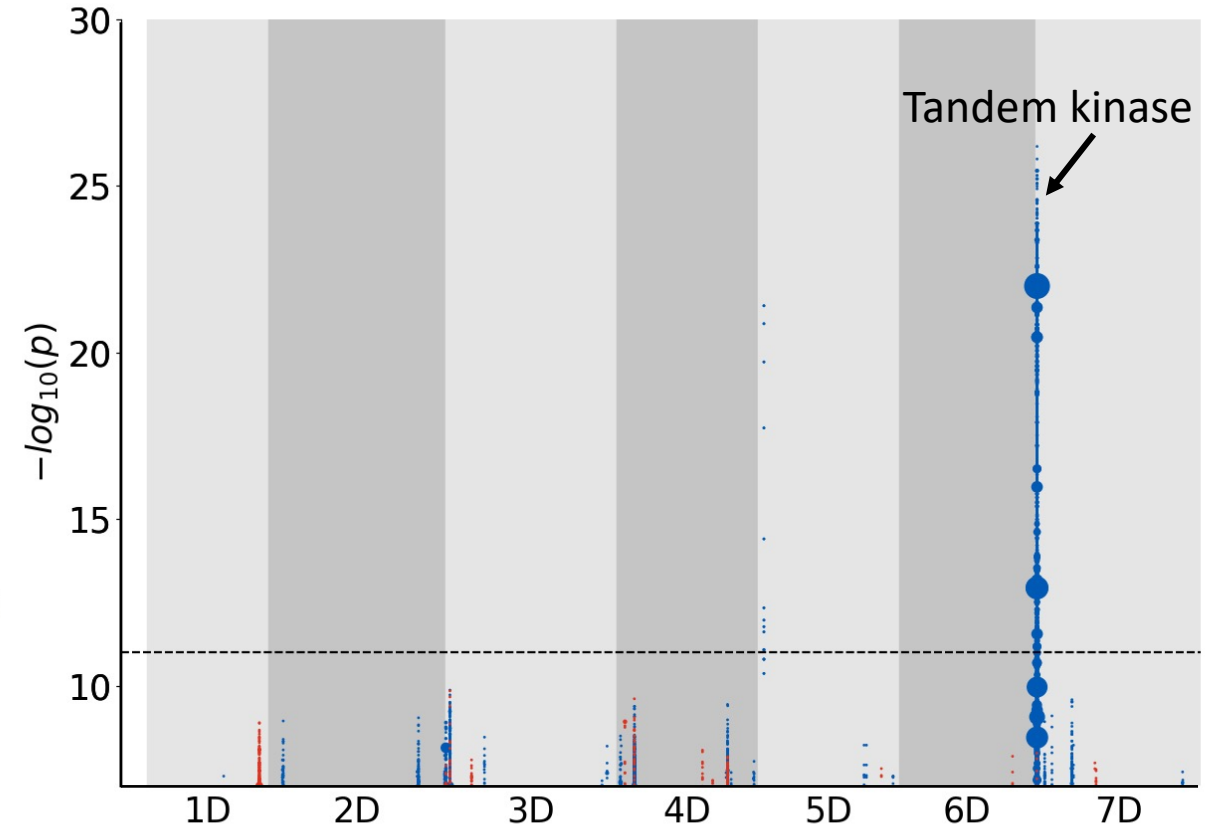
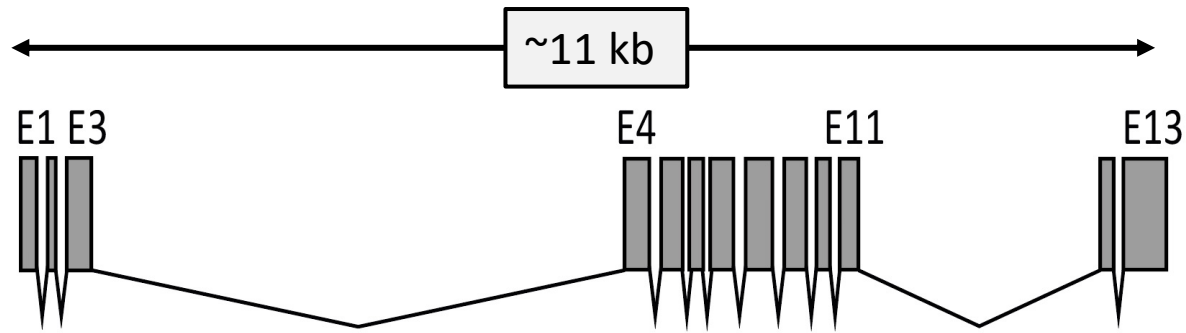
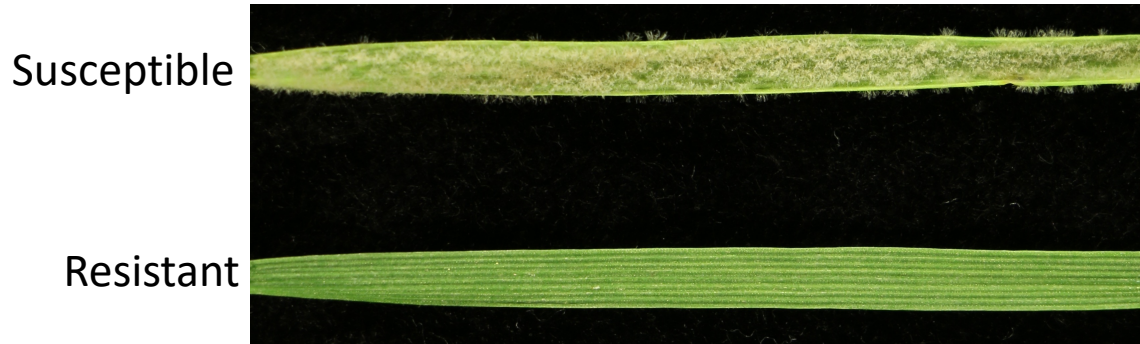
Reference-based association mapping



Reference-free association mapping



1. Powdery mildew resistance



B. Keller



J.S. Martín

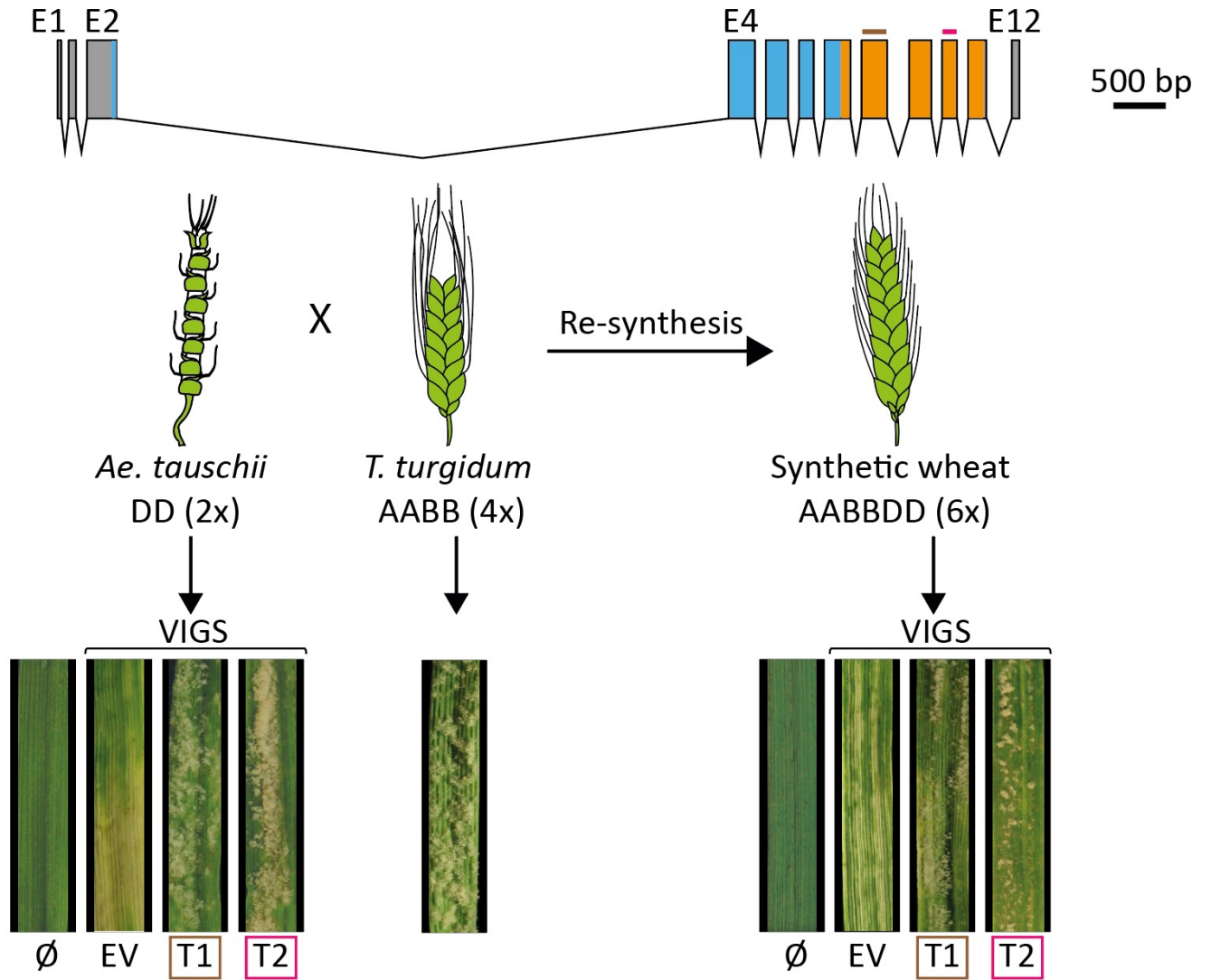


B. Keller

Validation of PM resistance

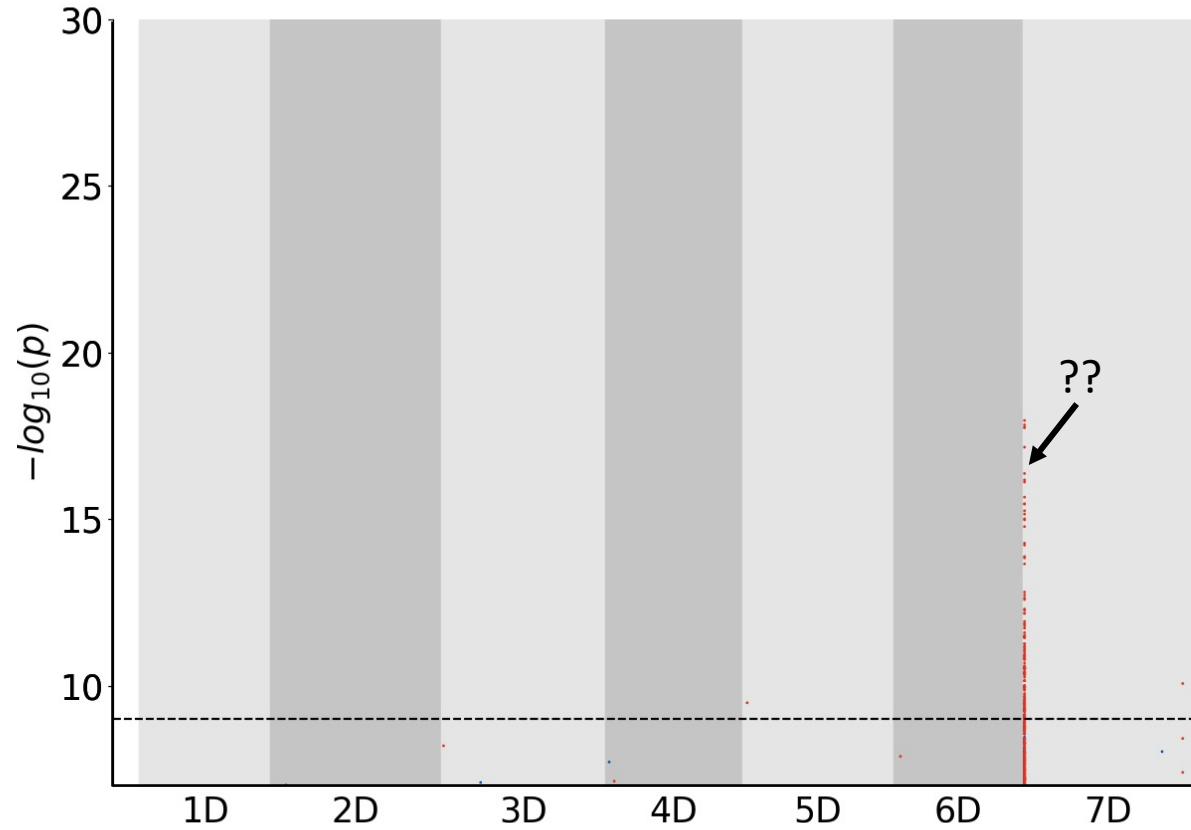


J.S. Martín



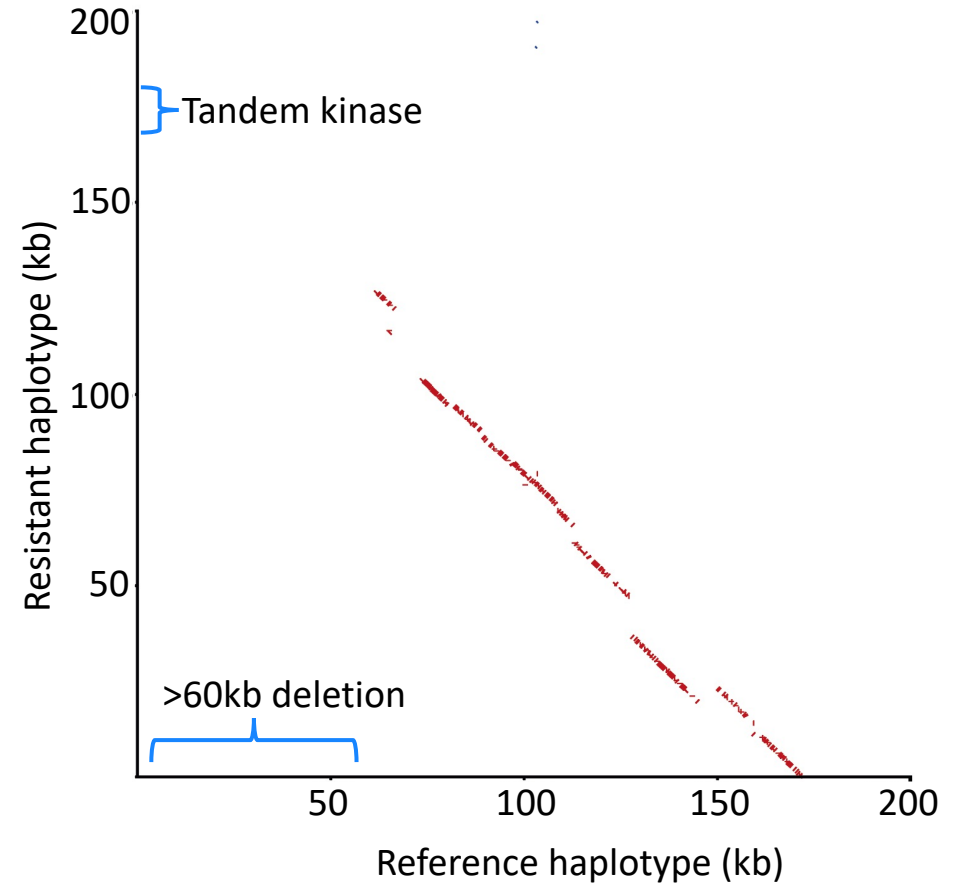
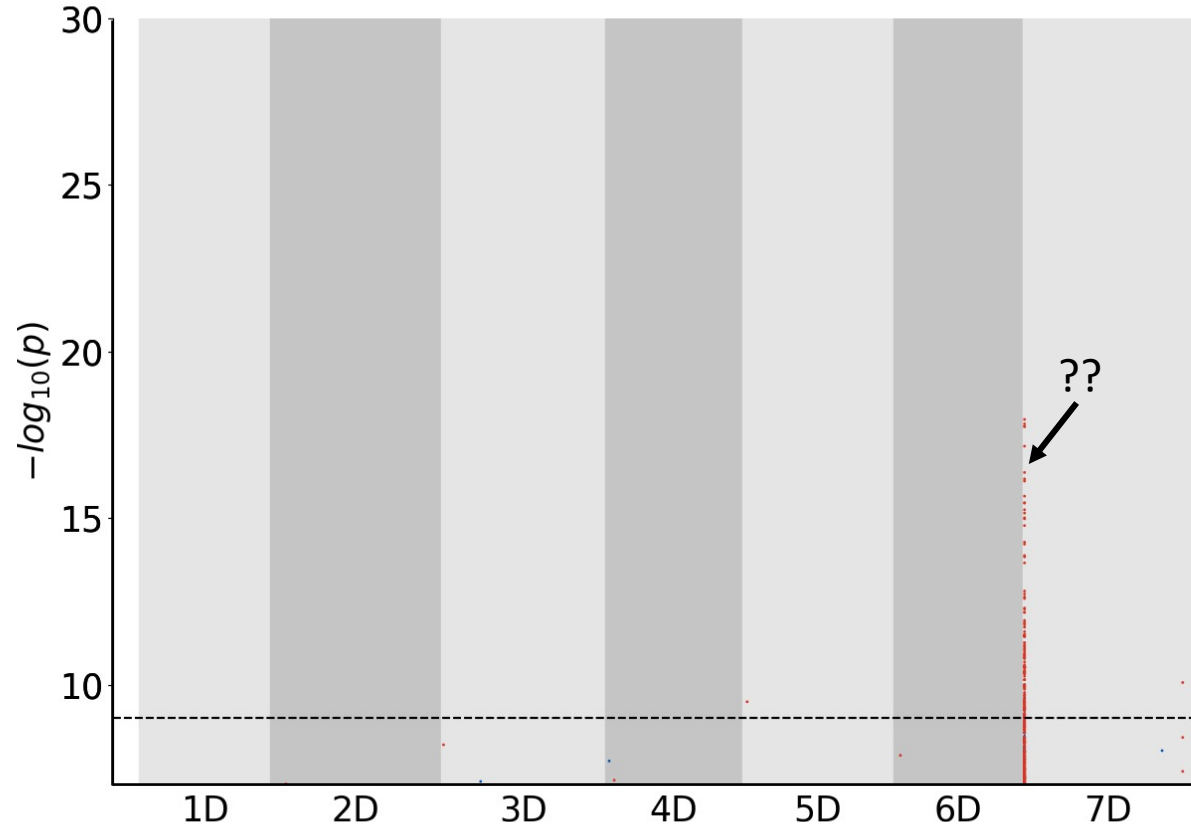
Why k -mer based GWAS?

SNP GWAS

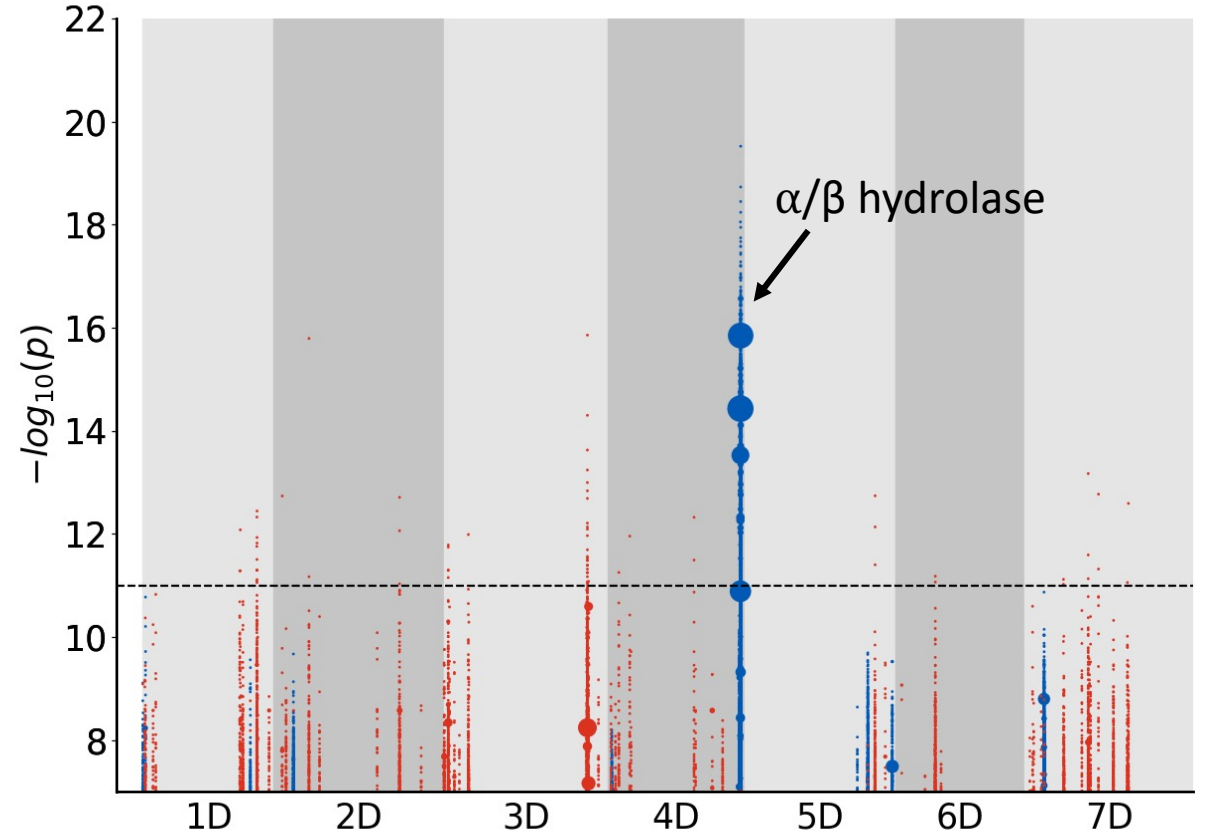
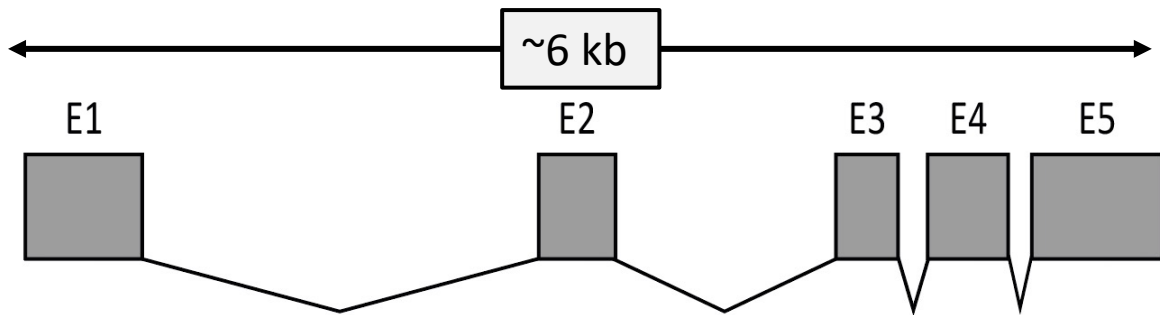


Why k -mer based GWAS?

SNP GWAS



2. Leaf trichome density



P. Nicholson

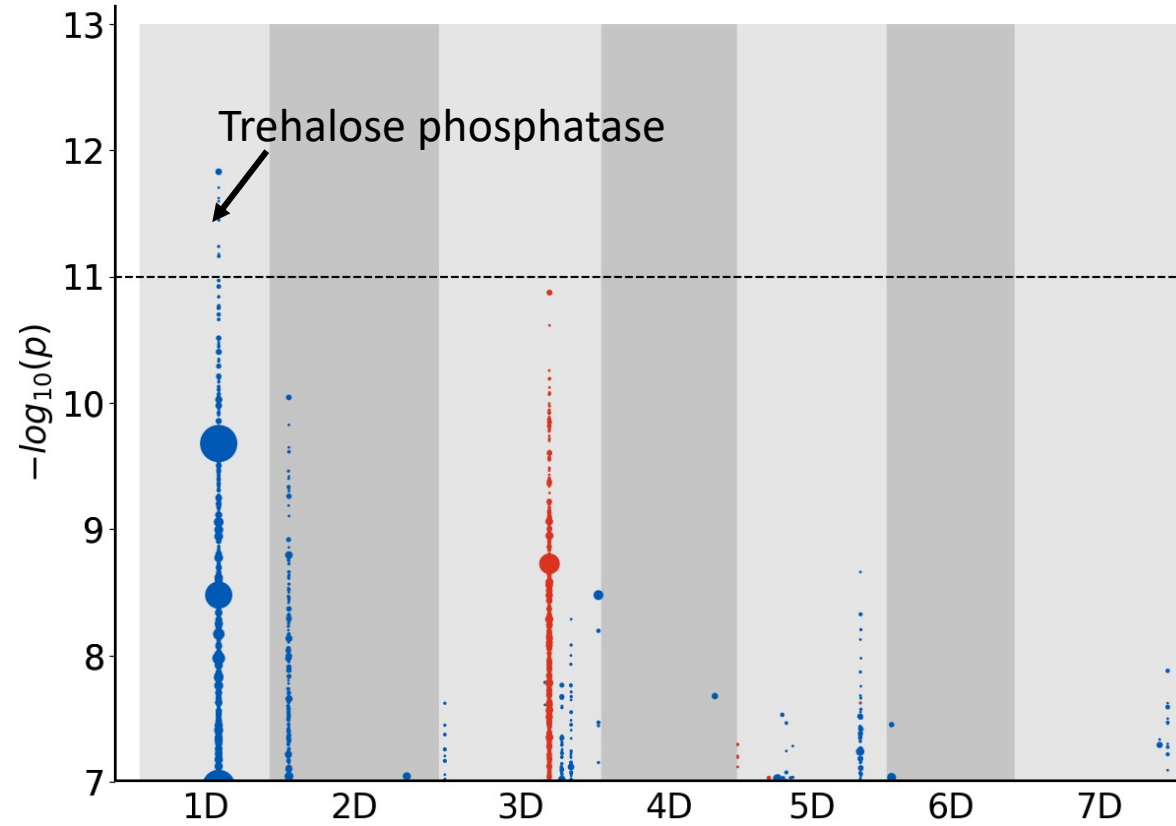
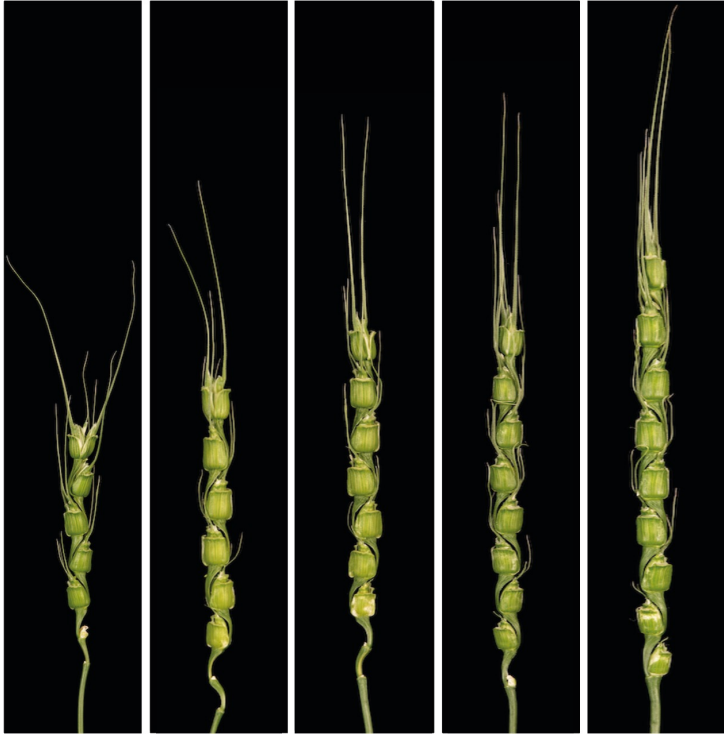


S. Pearce



C. Chinoy

3. Spikelet number

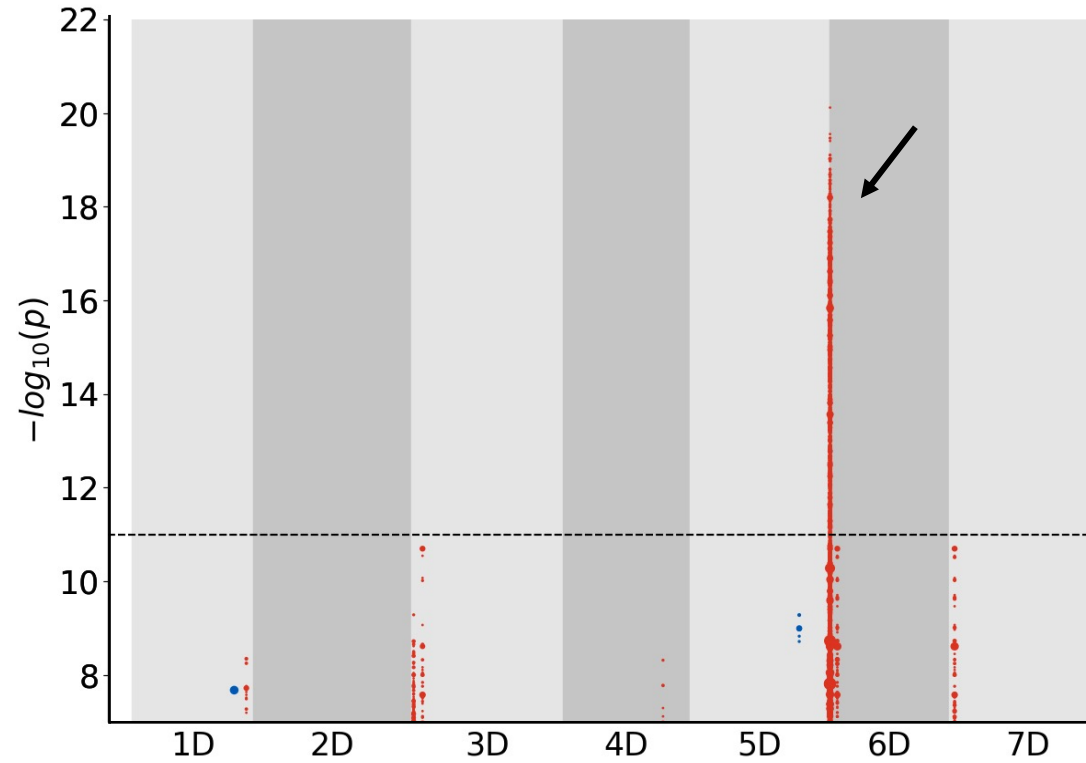


G. Brar



HR Kutcher

4. Wheat curl mite resistance



J. Poland

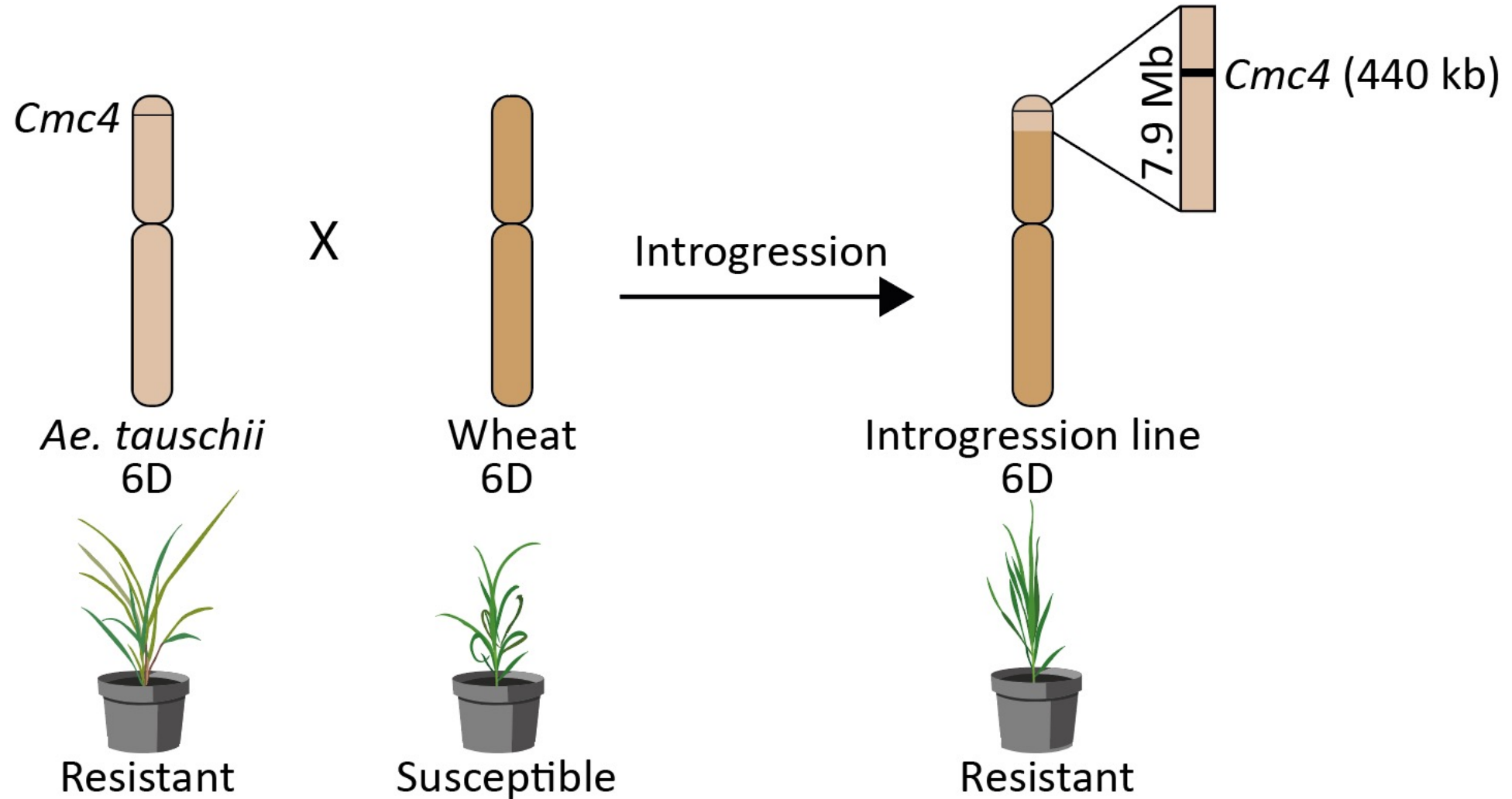


P. Silva



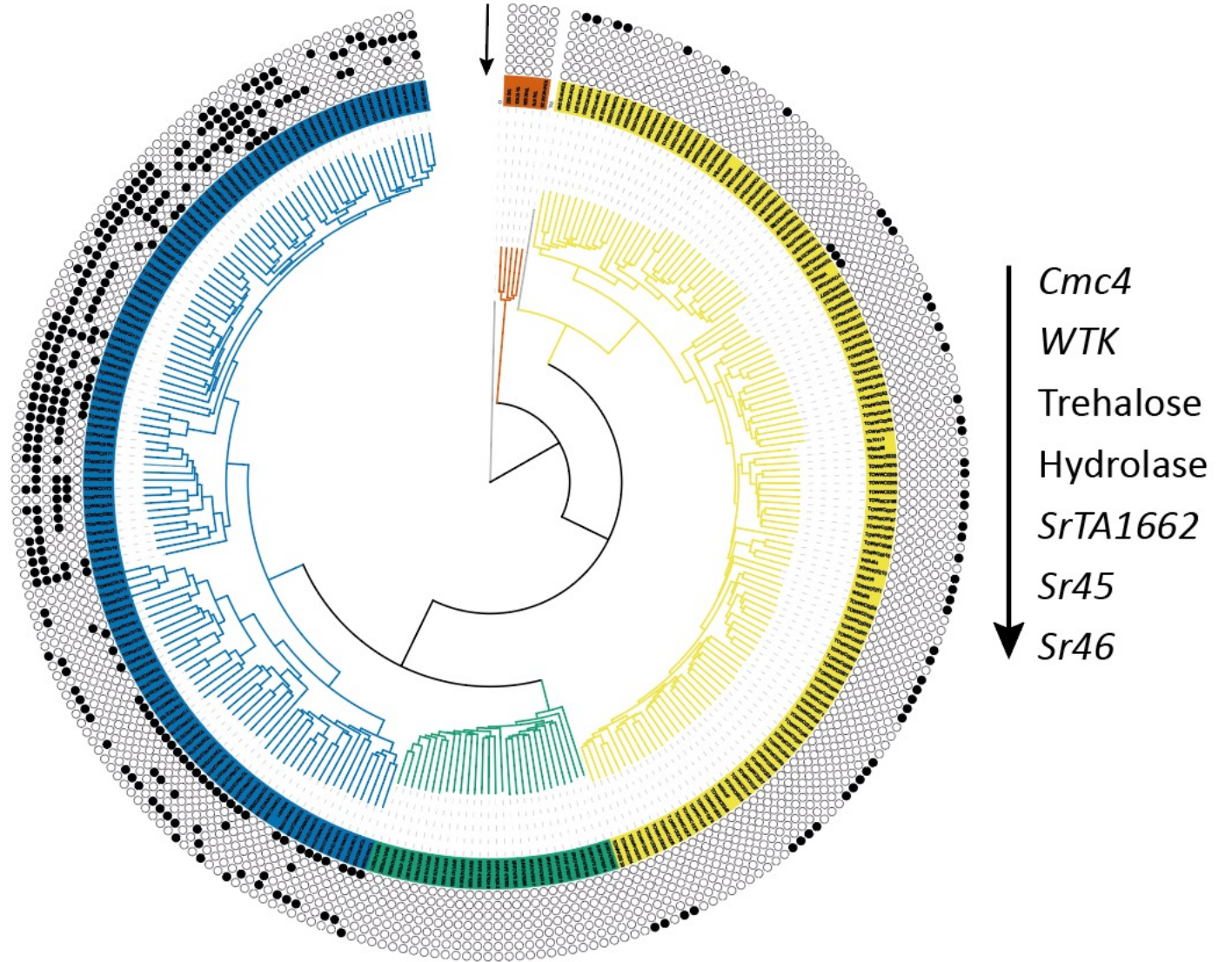
L. Gao

Introgression of wheat curl mite resistance



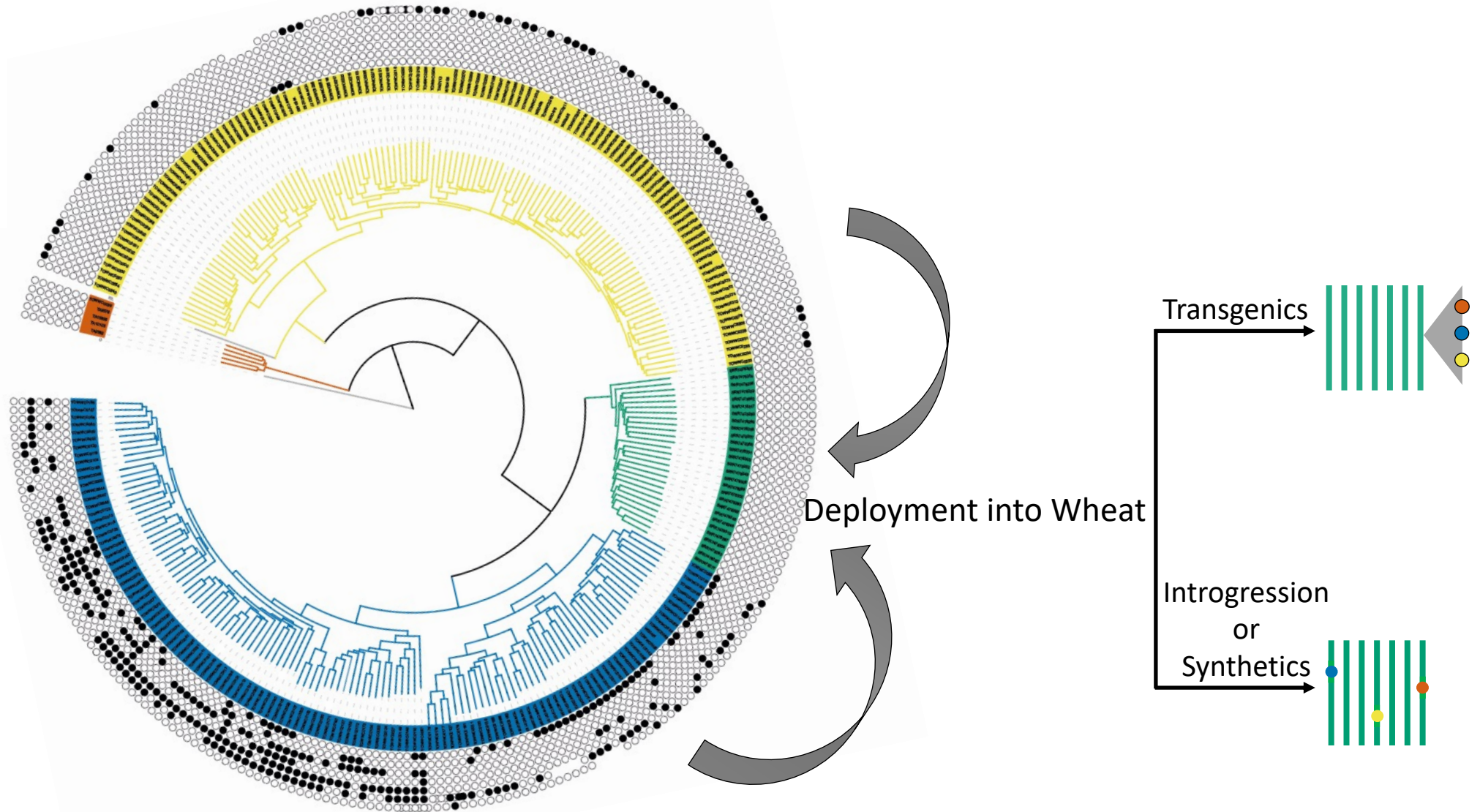
Allelic heterogeneity in the three lineages of *Ae. tauschii*

- Lineage 1
- Lineage 2
- Lineage 3
- Wheat

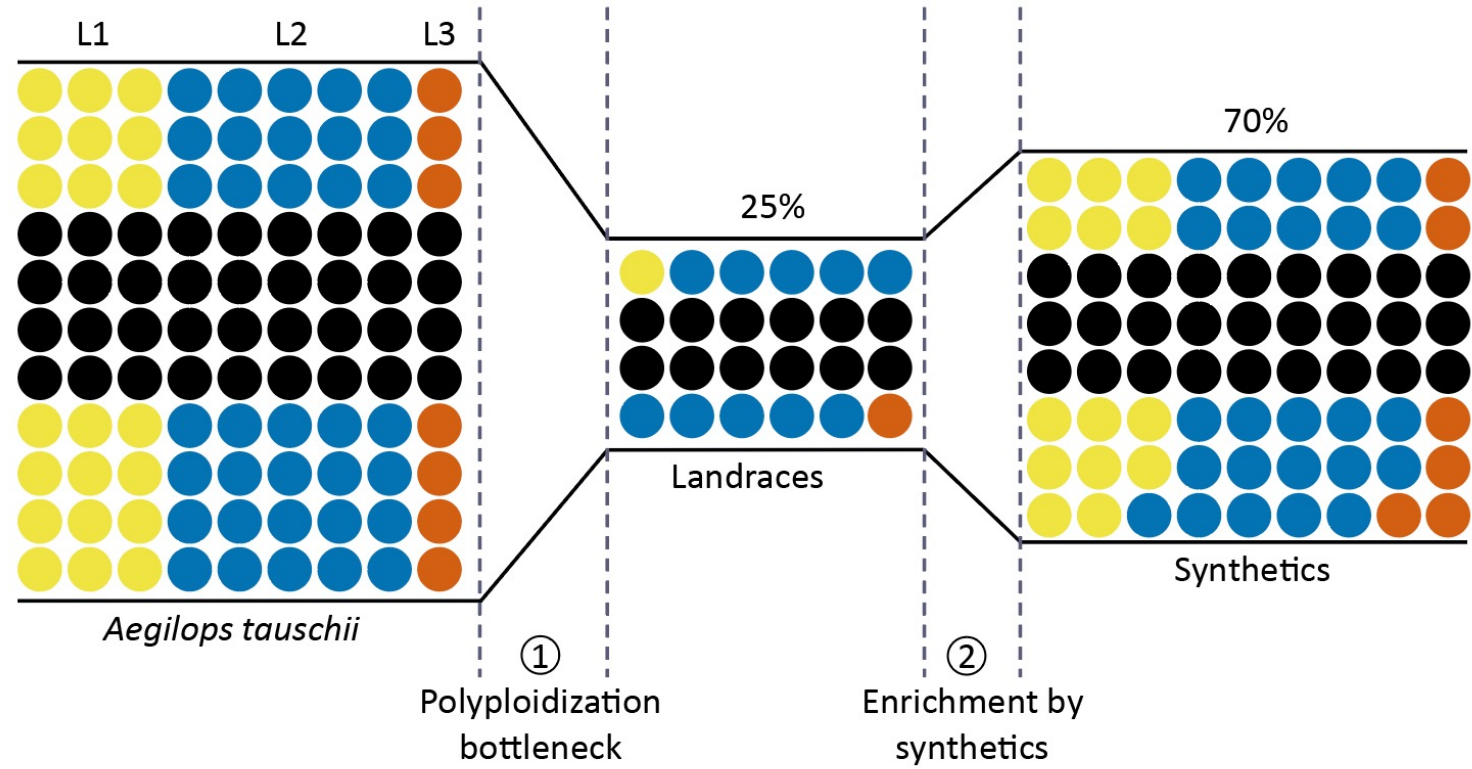


Diversifying the wheat gene pool

- Lineage 1
- Lineage 2
- Lineage 3
- Wheat



Capturing the
Ae. tauschii diversity
through synthetics





OPEN

Population genomic analysis of *Aegilops tauschii* identifies targets for bread wheat improvement

Kumar Gaurav^{1,39}, Sanu Arora^{1,39}, Paula Silva^{2,3,39}, Javier Sánchez-Martín^{4,39}, Richard Horsnell^{5,39}, Liangliang Gao², Gurcharn S. Brar^{6,7}, Victoria Widrig⁴, W. John Raupp², Narinder Singh^{2,36}, Shuangye Wu², Sandip M. Kale⁸, Catherine Chinoy¹, Paul Nicholson¹, Jesús Quiroz-Chávez¹, James Simmonds¹, Sadiye Hayta¹, Mark A. Smedley¹, Wendy Harwood¹, Suzannah Pearce¹, David Gilbert¹, Ngonidzashe Kangara¹, Catherine Gardener¹, Macarena Forner-Martínez¹, Jiaqian Liu^{1,9}, Guotai Yu^{1,37}, Scott A. Boden^{1,10}, Attilio Pascucci^{1,11}, Sreya Ghosh¹, Amber N. Hafeez¹, Tom O'Hara¹, Joshua Waites¹, Jitender Cheema¹, Burkhard Steuernagel¹, Mehran Patpour¹², Annemarie Fejer Justesen¹², Shuyu Liu¹³, Jackie C. Rudd¹³, Raz Avni¹⁴, Amir Sharon¹⁴, Barbara Steiner¹⁵, Rizky Psthika Kirana^{15,16}, Hermann Buerstmayr¹⁵, Ali A. Mehrabi¹⁷, Firuza Y. Nasyrova¹⁸, Noam Chayut¹⁹, Oadi Matny²⁰, Brian J. Steffenson²⁰, Nitika Sandhu²¹, Parveen Chhuneja²¹, Evans Lagudah²², Ahmed F. Elkot²³, Simon Tyrrell²⁴, Xingdong Bian²⁴, Robert P. Davey²⁴, Martin Simonsen²⁵, Leif Schauser²⁵, Vijay K. Tiwari²⁶, H. Randy Kutcher⁶, Pierre Hucl⁶, Aili Li²⁷, Deng-Cai Liu²⁸, Long Mao²⁷, Steven Xu²⁹, Gina Brown-Guedira³⁰, Justin Faris²⁹, Jan Dvorak³¹, Ming-Cheng Luo³¹, Ksenia Krasileva³², Thomas Lux³³, Susanne Artmeier³³, Klaus F. X. Mayer^{33,34}, Cristobal Uauy¹, Martin Mascher^{8,35}, Alison R. Bentley^{5,38} ✉, Beat Keller⁴ ✉, Jesse Poland^{2,37} ✉ and Brande B. H. Wulff^{1,37} ✉

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LiangLiang Gao

Powdery mildew

Beat Keller (UTH)
Javier Sanchez Martin
Victoria Widrig

Spikelet number

Randy Kutcher (UOS)
Gurcharn Brar (UBC)
Pierre Hucl

Trichome number

Paul Nicholson (JIC)
Catherine Chinoy

***Ae. tauschii* panels**

John Raupp (KSU)
Colin Hiebert (AAFC)
Alison Bentley (NIAB)
Richard Horsnell (NIAB)
Jan Dvorak (UC Davis)



Unlocking Nature's Diversity

