



International Conference

# FROM SEED TO PASTA III

**A SUSTAINABLE DURUM WHEAT CHAIN  
FOR FOOD SECURITY AND HEALTHY LIVES**

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## **GENETIC AND GENOMIC RESOURCES USHER A STEP-CHANGE IN WHEAT RESEARCH AND BREEDING**

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Several developments over the past 18 months have radically changed the way we work with polyploid wheat. Both hexaploid and tetraploid wheat now have whole genome sequences and reliable gene models. We have developed *in-silico* mutant resources with over 95% of genes with either a knockout or deleterious allele in both tetraploid and hexaploid wheat. We recently published a comprehensive gene expression atlas in wheat with over 850 RNA-Seq samples along with co-expression and transcription factor target networks. All this data is open-access and displayed at *EnsemblPlants*. Novel strategies have accelerated cloning of disease resistance and other genes. Using accelerated growth conditions (speed breeding), the community now routinely grows wheat in 10-week seed-to-seed cycles compared to the previous 16-20 weeks. All these developments have dramatically lowered the barriers to undertake biological research in polyploid wheat. For many purposes, wheat can now be treated (almost) like a model crop species. The next phase will be to start understanding the biological mechanisms underlying the most important traits in polyploid wheat and to design strategies to ensure this knowledge is quickly transferred to the field. We argue that given polyploidy, breeders have exploited only a fraction of the potential genetic variation in the wheat genome. The recent breakthroughs in wheat genomics now allow us to make a decisive effort towards exploiting this under-utilised variation, thereby unleashing the full potential of the wheat genome.

**ABSTRACT**