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Poster Communication Abstract – 6.30

COMPREHENSIVE ASSESSMENT OF TETRAPLOID GERMPLASM FOR PLANT DEVELOPMENTAL TRAITS RELATED TO GRAIN YIELD INCLUDING SPIKE FERTILITY AND GRAIN SIZE AND SHAPE

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Durum wheat (Triticum turgidum L. ssp. durum) is one of the major staple crops in the world, being the main source for the production of pasta, semolina and couscous. The ever-growing food demand of an increasing world population has brought in the need of an improved grain yield potential. Moreover, durum wheat is a tetraploid species adapted to a range of environments, from favorable to semi-arid and different developmental adaptations, including at the reproductive level, have been selected, also due to human-driven selection. Understanding the genetic basis of grain yield potential and regulation is therefore crucial to fit the genetic architecture of a cultivar to the target environment.

The Global Durum Panel (GDP) is a wheat collection composed mainly of durum modern cultivars and durum landraces, for a total of nearly 800 accessions. The Tetraploid Global Collection (TGC) consists of approximately 1800 genotypes, comprehensively sampling wild emmer wheat, domesticated emmer wheat, durum landraces, and other durum subspecies. Both panels were genotyped using the wheat high-density Illumina iSelect 90K SNP assay to

provide a common genotype framework.

In this ongoing study, GDP and TGC were evaluated in multiple field trials in different environments over two seasons. The field trials were located in Cadriano, Fiorenzuola d'Arda (Northern Italy) and Grosseto (Central Italy) in 2019-2020-2021. The collections were grown in plots of 1 square meter under an unreplicated modified augmented design divided in rows, columns and blocks. Checks were randomly distributed in each block in the field layout.

For each accession, six spikes were characterized for several yield-related traits (i.e. average spike length, sterile spikelet number, fertile spikelet number, number of fertile florets per central spikelet). Threshed seeds were weighted and scanned for grain size, grain shape and grain color analysis. Some traits showed a remarkable variability in each trial such as fertile spikelet number (from 12 to 41) and number of fertile florets per central spikelet (from 1 to 12). This variability has been highlighted especially in the TGC, thus indicating a higher range of diversity in the ancestral wheat. GWAS was conducted for the GDP and TGC including the kinship matrix K in the mixed models.

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