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Abstract – SY04

INVESTIGATING ROOT GROWTH ANGLE IN DURUM WHEAT FOR IMPROVED ROOT IDEOTYPES DEVELOPMENT

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Root Growth Angle (RGA) is an important component of Root System Architecture (RSA) in durum wheat as well as in crops in general, as it contributes to determine soil resources uptake efficiency. Studies on RSA have become of interest to wheat breeding research due to climate change effects and the need towards more sustainable agricultural practices. Both of them require the development of varieties capable to adapt to suboptimal growth conditions without penalizing crop productivity and yield stability. With the objective of identifying additional genomic information on the RGA QTLome in durum wheat, GWAS was performed on three durum wheat collections, including: i) the initial UNIBO durum panel (data from Maccaferri et al. 2016, J. Exp. and from an experiment conducted on the GrowScreen-Rhizo phenotyping platform at Juelich Forschungszentrum, Germany), ii) the GDP collection (GDP – Global Durum Panel, assembled by Wheat Initiative, Durum wheat expert working group), freely available at ICARDA, composed of 762 genotypes including 500 varieties and advanced breeding lines from worldwide breeding programs and 250 Mediterranean durum landraces, iii) Ethiopian landrace durum panel (c/o Ayele Badebo). All collections have been completely characterized with the iSelect Illumina 90K wheat SNP array. A protocol for quick phenotyping of RGA on seminal roots was set up and implemented based on blue filter paper sheets. Overall, three region appear to harbor QTLs most strongly related to RGA. These regions are located respectively on chromosome 2A, 6A and 7A, with the QTL on 6A being the strongest one (higher P-value and R2 and supported by the majority of analysis on different materials). Distinct haplotypes have been identified for each QTL, corresponding to narrow (ICARDA and Italian materials) or shallow (CIMMYT germplasm) root effects, respectively. Further investigation on these regions will allow developing KASP assays associated with narrow/ wide RGA that will contribute to the development of specific improved root ideotypes in wheat. This research is framed in the project “Rooty: A root ideotype toolbox to support improved wheat yields” led by the National Institute of Agricultural Botany (UK).