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# FROM SEED TO PASTA III

A SUSTAINABLE DURUM WHEAT CHAIN  
FOR FOOD SECURITY AND HEALTHY LIVES



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## ENHANCING GRAIN YIELD BY KNOCK DOWN GRAIN WEIGHT 2 GENES IN DURUM WHEAT

Francesco Sestili\*, Riccardo Pagliarello\*, Alessandra Zega\*\*, Rosaria Saletti\*\*, Anna Pucci\*, Ermelinda Botticella\*, Stefania Masci\*, Silvio Tundo\*, Ilaria Moschetti\*, Salvatore Foti\*\*, Domenico Lafiandra\*

\*Department of Agriculture and Forest Sciences, University of Tuscia, Via S. Camillo de Lellis, 01100 Viterbo, Italy

\*\*Department of Chemical Sciences, University of Catania, Viale A. Doria 6, 95125 Catania, Italy

*Grain Weight 2 (GW2)* has been identified as a key gene for yield in several crop species. In durum wheat two homeoalleles (*GW2-A1* and *-B1*) have been identified and located on the short arm of chromosomes 6A and 6B. In the present study an RNA interference approach permitted to down regulate the *GW2* genes in the durum wheat cultivar Svevo. The gene expression analysis on immature (21 DPA) T<sub>4</sub> seeds highlighted a drastic reduction (>75%) of *GW2* transcript in the *GW2*-RNAi lines compared to wild type (cv Svevo). Significant differences were detected for parameters related to yield and grain morphology. In particular, total starch (determined on single kernel), grain width and grain area were increased in all the transgenic lines in the range 10-40%, 4-13% and 3-5%, respectively. In addition, a transcriptional analysis was performed on target genes whose expression was found to be modulated by the knock down of *TaGW2-A1* in previous studies. qRT-PCR analysis highlighted that the transcript abundance of the cytokinin dehydrogenase 1 (*CKX1*) and the large subunit of ADP-glucose pyrophosphorylase (*AGPL*) were strongly up-regulated in the three transgenic lines compared to the control, whereas a different transcriptional behavior was observed for the cytokinin dehydrogenase 2 (*CKX2*) and the gibberellin 3-oxidase (*GA3-ox*), that were less expressed in the transgenic lines. A comparative proteomic study, performed on the metabolic fraction extracted from mature kernels, allowed to detect some differentially expressed proteins (DEPs) involved or potentially involved in the cell wall development.

ABSTRACT