

TRITIMED, a multidisciplinary project to improve drought adaptation in durum wheat

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Durum wheat is one of the most widely cultivated crops in the Mediterranean basin. It is mainly grown under rainfed conditions characterized by drought and thus water is a major determinant of growth and final yield. Molecular genetics and genomic tools offer new opportunities to identify allelic variation, study candidate genes and select loci defining responses and yield adaptation to drought. The EUFVI TRITIMED project <http://www.rothamsted.bbsrc.ac.uk/cpi/mers/dh.html> integrates quantitative genetics, crop physiology, transcriptome and biochemical network studies to identify loci controlling wheat responses and growth under drought. A mapping population of durum wheat from cv. Lahn (high yield potential) x cv. Cham1 (drought adaptation) was studied in different field environments in Syria, Tunisia, Morocco, Spain and Italy. Quantitative trait loci for grain yield, yield components, plant development, photosynthetic and physiological traits have been identified from over 30 field trials. GxE interactions will be explored to screen for loci specific to each environment and to identify relevant ideotypes. Individuals showing stability of yield under drought were selected for transcriptome studies under controlled environment and field conditions. Pathway and network analysis of global gene expression using ONDEX is uncovering metabolic pathways involved in early and late responses to water stress in top performing genoplasm. Our results demonstrate that genetic variability in regulation of stomatal conductance and osmotic adjustment play a major role in determining yield stability of durum wheat under drought conditions in the Mediterranean.

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