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HARNESSING WILD WHEAT ALLELES TO ENHANCE YIELD STABILITY AND PRODUCTIVITY OF MODERN WHEAT

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The potential of wild emmer wheat (*Triticum turgidum* ssp. *dicoccoides*) to enhance drought resistance of its domesticated progenies, durum wheat (*T. turgidum* ssp. *durum*) and bread wheat (*T. aestivum*) was studied. A germplasm collection of wild emmer wheat exhibited a wide diversity of drought responses and a considerable advantage in drought resistance over three domesticated durum wheat cultivars. A recombinant inbred line population derived from a cross between durum wheat (cv. Langdon) and wild emmer wheat (acc. G18-16) was used to construct a genetic map and to identify quantitative trait loci (QTLs) conferring drought resistance and related morph-physiological traits. Marker assisted selection was used to introgress major QTL alleles from wild emmer wheat into four modern durum and bread wheat cultivars and the resultant near isogenic lines (NILs) were tested for their drought responses. NILs introgressed with wild emmer QTL on chromosome 7A, exhibited under water-limited conditions greater grain yield, osmotic adjustment, photosynthetic capacity and root development compared with their recurrent parent. Selected NILs, carrying the 7A QTL in two genetic backgrounds, tested across 3 years under commercial field conditions, exhibited a significant advantage over their parental cultivars, particularly under drought, thus confirming the potential of this left behind QTL allele for improving drought resistance in modern wheat. Two selected drought-adaptive QTL allels from wild emmer wheat are currently under a fine mapping study, aimed to identify candidate genes underlying their effects.