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Genetic resources and breeding methodologies for improving drought tolerance in wheat

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Yield gains from rain-fed wheat (*Triticum aestivum* L.) production, particularly in areas experiencing intermittent and terminal dry spells, can be realized through integrated breeding with promising genetic and genomic resources using appropriate methodologies. This enables targeted recombination of novel genes for drought tolerance and selection of desirable genotypes. Continuous exploration of new sources of genetic variation and introgression of suitable genes into elite drought-susceptible genotypes, including via transgenic approaches; and the use of genome editing could offer exciting future prospects in acquiring drought-tolerant wheat genotypes. This review highlights available genetic resources, major wheat gene banks and databases as well as breeding methodologies for drought tolerance in wheat, including pre-breeding, conventional breeding, hybrid breeding, and genomics-assisted breeding. The potential of genetic modification through the transgenic and genome-editing approaches is also discussed. Emphasis is placed on how best these breeding methods can be brought together to develop strategies aimed at improving drought tolerance in wheat.

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