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Effects of water deficit on flour mixing properties, breadmaking quality and storage protein compositions in bread wheat (*Triticum aestivum* L.)

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Water deficiency affects grain proteome dynamics and storage protein compositions, resulting in alterations in gluten viscoelasticity. In this study, we investigated the effects of field water deficit on wheat breadmaking quality and grain storage proteins. Water deficiency produced a shorten grain-filling period and a decrease in grain number, grain weight and grain yield, a reduced starch granule; increased protein content and glutenin macropolymer contents, resulting in superior dough properties and breadmaking quality. Reversed-phase ultra-performance liquid chromatography analysis showed that the total gliadin and glutenin content, as well as the accumulation of individual composition, were significantly increased by water deficiency. Two-dimensional gel electrophoresis detected 144 individual storage protein spots with significant accumulation changes in developing grains under water deficit. The comparative proteomics analysis revealed that water deficiency resulted in significant upregulation of 12 gliadins, 12 HMW-GSs and 46 LMW-GSs. Quantitative real-time polymerase chain reaction analysis revealed that the expression of two storage protein biosynthesis related transcription factors *Dof* and *Spa* was upregulated by water deficiency. Our results illustrated that water deficiency leads to an increased accumulation of storage protein compositions and an upregulated expression of *Dof* and *Spa*, resulting in an improvement of glutenin strength and breadmaking quality.

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