

不同灌水处理对强筋小麦谷蛋白大聚合物粒度分布和品质的影响

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Effects of irrigation scheme on the grain glutenin macropolymer's size distribution and the grain quality of winter wheat with strong gluten.

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摘要

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摘要

在田间条件下,以两个优质强筋小麦品种(藜城8901和济麦20)为供试材料,研究了不同灌水处理(全生育期不灌水、拔节期灌1次水、越冬期和拔节期灌2次水、越冬期、拔节期和灌浆期灌3次水,每次灌水量 $675\text{ m}^3 \cdot \text{hm}^{-2}$)对强筋小麦谷蛋白大聚合物含量与粒度分布、品质和产量的影响.结果表明:两个小麦品种的面团形成时间、面团稳定时间、面包体积、籽粒产量、谷蛋白大聚合物含量以及体积加权平均粒径、表面积加权平均粒径、粒径 $>100\text{ }\mu\text{m}$ 的体积百分比和表面积百分比均以灌2水处理最高.相关分析显示,两个小麦品种的面团形成时间、面团稳定时间和面包体积与粒径 $<10\text{ }\mu\text{m}$ 和 $10\sim 100\text{ }\mu\text{m}$ 的谷蛋白大聚合物颗粒体积百分比呈显著负相关,而与粒径 $>100\text{ }\mu\text{m}$ 的谷蛋白大聚合物颗粒体积百分比、体积加权平均粒径和表面积加权平均粒径呈显著正相关.水分供应过多或过少均不利于籽粒产量和品质的同步改善,灌溉水平可通过改变谷蛋白大聚合物粒度分布影响小麦籽粒品质.

关键词: 强筋小麦 灌溉 产量 品质 谷蛋白大聚合物

Abstract:

Taking two winter wheat (*Triticum aestivum* L.) cultivars (Gaocheng 8901 and Jimai 20) with high quality strong gluten as test materials, a 2-year field experiment was conducted to study the grain glutenin macropolymer (GMP)'s content and size distribution, grain quality, and grain yield under effects of different irrigation schemes. The schemes included no irrigation in whole growth period (W_0), irrigation once at jointing stage (W_1), irrigation two times at wintering and jointing stages (W_2), respectively, and irrigation three times at wintering, jointing, and filling stages (W_3), respectively, with the irrigation amount in each time being $675\text{ m}^3 \cdot \text{hm}^{-2}$. Among the test irrigation schemes, W_2 had the best effects on the dough development time, dough stability time, loaf volume, grain yield, GMP content, weighted average surface area of particle $D_{3,2}$, weighted average volume of particle $D_{4,3}$, and volume percent and surface area percent of particle size $>100\text{ }\mu\text{m}$ of the two cultivars. The dough development time, dough stability time, and loaf volume were negatively correlated with the volume percent of GMP particle size $<10\text{ }\mu\text{m}$ and $10\sim 100\text{ }\mu\text{m}$, while positively correlated with the volume percent of GMP particle size $>100\text{ }\mu\text{m}$, $D_{3,2}$, and $D_{4,3}$. It was suggested that both water deficit and water excess had detrimental effects on the grain yield and grain quality, and irrigation level could affect the wheat grain quality through altering GMP particle size distribution.

Key words: winter wheat with strong gluten irrigation grain yield grain quality glutenin macropolymer (GMP).

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