

大气CO₂浓度和氮肥水平对小麦籽粒产量和品质的影响

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Effects of atmospheric CO₂ concentration enhancement and nitrogen application rate on wheat grain yield and quality.

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摘要

应用FACE平台,研究了不同氮肥水平下大气CO₂浓度升高对小麦籽粒产量和品质的影响.结果表明:大气CO₂浓度升高(FACE)和增施氮肥显著提高了小麦籽粒产量、穗数、穗粒数和生物量.但FACE处理对收获指数无显著影响.FACE处理显著降低了籽粒蛋白质、醇溶蛋白、谷蛋白、面筋含量和沉降值,显著提高了小麦籽粒淀粉及其组分含量,而氮肥处理具有相反的效应.面团稳定时间及峰值黏度、最终黏度、反弹值等黏度特征参数在FACE和高氮水平下显著增加.此外,CO₂浓度与氮肥水平互作对小麦籽粒产量和生物量有显著的正效应,但对籽粒品质无显著影响.在未来大气CO₂浓度升高的情况下,维持较高的施氮量有利于提高小麦籽粒产量,改善淀粉糊化特性,缓解小麦品质特性的下降.

关键词: 小麦 产量 品质 FACE 氮肥

Abstract:

FACE platform was applied to study the effects of elevated atmospheric CO₂ concentration on wheat grain yield and quality under two nitrogen(N) application rates. Elevated atmospheric CO₂ concentration and applying N increased the grain yield, spike number, grain number per spike, and biomass significantly, but elevated CO₂ concentration had no significant effects on harvest index (HI). Under elevated CO₂ concentration, there was a significant decrease in the protein, gliadin, gluteinin, and glutein contents of the grain and the sedimentation value of the flour, and a significant increase in the starch and its components contents of the grain; under N application, an inverse was observed. The dough stability time and the dough viscosity characteristics, such as peak viscosity, final viscosity, and setback value, increased significantly under elevated CO₂ concentration and high N application rate. The interaction of atmospheric CO₂ concentration and N application rate had significantly positive effects on wheat grain yield and biomass, but less effect on grain quality. Therefore, with elevated atmospheric CO₂ concentration in the future, maintaining a higher N application level would benefit wheat grain yield and paste characteristics, and mitigate the decline of grain quality.

Key words: wheat yield quality FACE nitrogen fertilizer

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