

论文

利用揉面特性鉴定小麦1BL/1RS易位系

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摘要:

1BL/1RS易位系曾广泛用于小麦农艺性状改良, 但对加工品质有明显的负面影响。利用404份F₅至F₈高代品系(试验I)和175份山东省主栽品种及高代品系(试验II), 研究1BL/1RS易位对小麦揉面参数的影响, 分析不同高低分子量蛋白亚基(HWM/LWM-GS)背景下1BL/1RS的揉面特性, 探讨利用揉面特性鉴定1BL/1RS易位系的方法。结果表明, 1BL/1RS易位系的揉面时间、峰值带宽及峰后1 min带宽显著低于非1BL/1RS易位系, 而衰落角和带宽比(峰值带宽/峰后1 min带宽)显著高于非1BL/1RS易位系, 说明1BL/1RS易位导致小麦的揉面特性显著变劣。易位系的揉面谱带的主要特征为峰后1 min谱带急剧衰落并变窄, 带宽比显著增大, 而非1BL/1RS易位系的峰后谱带衰落、变窄平缓或者稳定时间较长, 带宽比较小。带宽比1.6可作为判断易位系的有效指标, 即大于或等于1.6为1BL/1RS易位系, 小于1.6为非1BL/1RS易位系, 准确率达85.2%(试验I)和96.8%(试验II)。尽管优质HWM-GS背景对*Glu-B3j*(1BL/1RS易位系)的揉面特性有一定正向补偿作用, 但品质特性仍显著劣于其他*Glu-B3*位点, 带宽比表现尤为突出。因此, 揉面特性不仅能测定育种材料的面团流变学特性, 而且还能有效鉴别1BL/1RS易位系。

关键词: 普通小麦 1BL/1RS易位 揉面特性

Identification of 1BL/1RS Translocation Based on Mixograph Parameters in Common Wheat

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Abstract:

1BL/1RS translocation has been widely used for improving agronomic performance and disease resistance in wheat (*Triticum aestivum* L.), however, it has strong negative effect on processing quality. To develop a method for 1BL/1RS translocation identification with mixograph parameters, 404 advanced lines from 146 crosses in 2005–2006 (Experiment I) and 175 advanced lines and main cultivars of Shandong Province (Experiment II) in 2005–2006 and 2006–2007 cropping seasons were used in this study. All materials were sown under irrigation condition in a randomized complete design with 1 replication in Jinan. The genetic effect of 1BL/1RS translocation on mixograph parameters was investigated. The variations of mixograph parameters under different combinations of the high molecular weight glutenin subunits (HWM-GS) and low molecular weight glutenin subunits (LMW-GS) were also analyzed. 1BL/1RS translocation lines showed significantly shorter mixing time, less bandwidth of peak and bandwidth after 1 min peak, and higher angle of descent and the bandwidth ratio (the ratio of bandwidth of peak/bandwidth after 1 min peak) in comparison with non-1BL/1RS translocation lines. It indicated that the 1BL/1RS translocation has deleterious effects on mixograph parameters. Mixograph of the 1BL/1RS translocation was characterized with the bandwidth sharply declining and narrowing after 1 min peak, and increasing the bandwidth ratio, whereas the bandwidth of non-1BL/1RS translocations declined gently after 1 min peak or had a longer mixing tolerance, and had a little variation about the bandwidth ratio. Furthermore, 85.2% (Experiment I) and 96.8% (Experiment II) accuracies were achieved in grouping the 1BL/1RS translocation and non-1BL/1RS translocation on the basis of the band width ratio, i.e., 1BL/1RS translocation line had a value more than or equal to 1.6, and non-1BL/1RS translocation line

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had a value smaller than 1.6. Although the *Glu-B3* alleles showed better quality parameters when HMW-GS 5+10 was presented, it was still the most unfavorable allele on mixograph parameters among all *Glu-B3* alleles. Therefore, mixograph parameters could be used to determine the rheological properties and the presence of 1BL/1RS translocation.

Keywords: Common wheat (*Triticum aestivum* L.) 1BL/1RS translocation Mixogram characteristics

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