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研究论文

HMW-GS和LMW-GS组成及1BL/1RS易位对春小麦品质性状的影响

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摘要 分析了221份春小麦品种（系）的HMW-GS、LMW-GS组成和1BL/1RS易位状况，并用其中104份品种（系）研究了HMW-GS和LMW-GS等位变异及1BL/1RS易位对品质性状的影响。结果表明，1、7+9、5+10、GluA3a和GluB3j分布较广，频率分别为57.5%、45.2%、63.8%、29.0%和42.5%。1BL/1RS易位系相当普遍，西北春麦区和东北春麦区频率分别为44.3%和34.2%。HMW-GS和LMW-GS等位变异对SDS沉降值、和面时间与耐揉性的影响达1%的显著水平，对籽粒蛋白质含量与不溶性谷蛋白含量的影响达5%显著水平。按位点贡献大小，Glu-D1> Glu-B3> Glu-B1> Glu-A1> Glu-A3；不同亚基对品质性状的效应存在显著差异，主要表现在反映面筋强度的品质参数上。亚基1、2*、5+10、Glu-A3d、Glu-B3f明显优于相应位点的其他亚基。1BL/1RS易位对和面时间有极显著的负向效应。

关键词 普通小麦 高分子量麦谷蛋白亚基 低分子量麦谷蛋白亚基 1BL/1RS易位 加工品质

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Effect of HMW and LMW Glutenin Subunits and Presence of 1BL/1RS Translocation on Quality Traits in Spring Wheat

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Abstract The composition of high molecular weight glutenin subunits (HMW-GS) and low molecular weight glutenin subunits (LMW-GS), and the presence or absence of 1BL/1RS translocation play an important role in determination of wheat quality. Totally, 221 spring wheat cultivars and advanced lines were used to survey the composition of HMW-GS and LMW-GS, and the presence of 1BL/1RS translocation. Effects of allelic variation in HMW-GS and LMW-GS and 1BL/1RS translocation on quality traits were investigated in 104 cultivars and lines. The results showed that subunits 1, 7+9, 5+10, GluA3a and GluB3j took dominant positions with the frequency of 57.5%, 45.2%, 63.8%, 29.0%, and 42.5%, respectively, and 44.3% of tested genotypes from Northwestern Spring Wheat Region (NWSWR) and 34.2% from Northeastern Spring Wheat Region (NESWR) carried 1B/1R translocation (Table 1). Allelic variation at Glu-1 and Glu-3 loci had significant influence on SDS sedimentation volume, and mixing time and mixing tolerance at 1% probability level, and on kernel protein content and relative insoluble glutenin content at 5% significant level (Table 2). According to the allele contribution to mixing time and mixing tolerance, the glutenin subunit loci were ranked as: Glu-D1> Glu-B3> Glu-B1> Glu-A1> Glu-A3 (Table 3). Various individual glutenin alleles had significant effect on quality traits, specially on gluten strengthen related parameters. They were ranked as: at Glu-A1 loci，1、2* >N, at Glu-D1，5+10 > 2+12, at Glu-A3，Glu-A3d > Glu-A3b >Glu-A3c > Glu-A3a, at Glu-B3，Glu-B3f > Glu-B3b > Glu-B3j (Table 3). The contribution of subunits 1, 2*, 5+10, Glu-A3d, Glu-B3f to mixing time and mixing tolerance are significantly larger than their counterpart allelic variations. The presence of 1B/1R translocation had a strong and negative effect on mixing time. The mixing time of Non-1BL/1RS cultivars and lines was 3.9 min while 1BL/1RS translocation was 3.5 min (Table 4).

Key words Common wheat HMW-GS LMW-GS 1BL/1RS translocation Processing quality

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