中国科学院研究生院学报 2011, 28(3) 336-341 DOI: ISSN: CN:

论文

青海春小麦*Glu-1*位点遗传多样性与谷蛋白溶胀指数分析

赵德勇[1,2], **刘永安**[1,2], **陈志国**[1], **窦全文**[1], **王海庆**[1], **沈裕虎**[1]

1. 中国科学院西北高原生物研究所, 西宁 810001;
2. 中国科学院研究生院, 北京 100049

摘要:

为了解青海省春小麦 *Glu-1* 位点的遗传多样性及其品质状况,检测了49个青海省代表性春小麦品种的高分子量麦谷蛋白亚基(HMW-GS)组成情况,并测定了每一品种的谷蛋白溶胀指数.共检测出15种高分子量麦谷蛋白亚基组合类型.在 *Glu-1* 位点检测到13种等位变异,其中 *Glu-A 1* 位点2个、 *Glu-B 1* 位点7个、 *Glu-D 1* 位点4个.实验数据表明,青海省春小麦品质较差,尚待改进.

关键词: 春小麦 遗传多样性 高分子量麦谷蛋白 谷蛋白溶胀指数

Analysis of genetic diversity of *Glu-1* and SIG of spring wheat in Qinghai province

ZHAO De-Yong[1,2], LIU Yong-An[1,2], CHEN Zhi-Guo[1], DOU Quan-Wen[1], WANG Hai-Qing[1], SHEN Yu-Hu[1]

1. Northwest Institute of Plateau Biology, Chinese Academy of Sciences 810001, China;
2. Graduate University, Chinese Academy of Sciences ,Beijing 100049, China

Abstract:

The high molecular weight glutenin subunit(HMW-GS) composition and the swelling index of glutenin (SIG) of 49 spring wheat varieties in Qinghai province were determined to assess the genetic diversity of *Glu-1* loci and the quality of the spring wheat. 15 HMW subunit patterns were observed. For the *Glu-1* loci, 13 alleles were detected: 2 at the *Glu-A 1* locus, 7 at the *Glu-B 1* locus, and 4 at the *Glu-D 1* locus. Statistic analysis revealed the necessity of improving the poor quality of spring wheat in Qinghai province.

Keywords: spring wheat genetic diversity high molecular glutenin swelling index of glutenin

收稿日期 2010-04-01 **修回日期** 2010-09-06 **网络版发布日期**

DOI:

基金项目:

国家科技支撑计划课题(2007BAD52B08)和中国科学院知识创新工程方向性项目(KSCX2-YW-N-052)资助

通讯作者:

作者简介:

作者Email: zgchen@nwipb.ac.cn

参考文献:

[1] Singh N K, Shepherd K W. Linkage mapping of the gene controlling endosperm proteins in wheat. I. Genes on the short arms of group1 chromosomes
[J]. Theoretical and Applied Genetics, 1988, 66: 628-641.

[2] Payne P I, Corfield K G, Blackman J A. Identification of a high molecular weight subunits of glutenin whose presence correlates with bread-making quality in wheats of related pedigree
[J]. Theoretical and Applied Genetics, 1979, 55: 153-159.

[3] Ma C X, Wu Z S. Effect of variation of protein fractions and HMW glutenin subunits on SDS sedimentation volume in wheat varieties
[J]. Acta Agronomica Sinica. 1993, 19(6): 562-566(in Chinese). 马传喜, 吴兆苏. 小麦胚乳蛋白质组分及高

分子量麦谷蛋白亚基与烘烤品质的关系
[J]. 作物学报, 1993, 19(6): 562-566.

[4] Yang Z J, Shu H L, Li G R, et al. Incorporation of new glutenin subunits to common wheat
[J]. Journal of Triticeae Crops, 2001, 21(1): 10-13(in Chinese). 杨足君, 舒焕麟, 李光蓉, 等. 向普通小麦品种导入优良谷蛋白亚基的研究
[J].麦类作物学报, 2001, 21(1): 10-13.

[5] Zhang X Y, Pang B S, You G X, et al. Allelic variation and genetic diversity at *Glu-1* loci in chinese wheat(*triticum aestivum* L) Germplasms
[J]. Scientia Agricultura Sinica, 2002, 35(11): 1302-1310(in Chinese). 张学勇, 庞斌双, 游光霞, 等. 中国小麦品种资源Glu-1位点组成概况及遗传多样性分析
[J]. 中国农业科学, 2002, 35(11): 1302-1310.

[6] Dong Y M, Yang X M, Chai S C, et al. HMW-GS composition in the representative wheat landraces from China
[J]. Journal of Triticeae Crops, 2007, 27(5): 820-824(in Chinese). 董永梅, 杨欣明, 柴守诚, 等. 中国小麦代表性地方品种高分子量谷蛋白亚基组成分析
[J]. 麦类作物学报, 2007, 27(5): 820-824.

[7] Kolster P, Krechting C F, van Gelder W M J. Quantification of individual high molecular weight glutenin subunits of wheat using SDS-PAGE and scanning densitometry
[J]. Journal of Cereal Science, 1992, 15: 49-61.

[8] Wang C, Kovacs M I P. Swelling index of glutenin test: I. Method and comparison with sedimentation, gel-protein, and insoluble glutenin tests
[J]. Cereal Chemistry, 2002, 79(2): 183-189.

[9] Wang C, Kovacs M I P. Swelling index of glutenin test: II. Application in prediction of dough properties and end-use quality
[J]. Cereal Chemistry, 2002, 79(2): 190-196.

[10] Sun J Z, Liu G T, Su Q, et al. Application of swelling index of glutenin for wheat quality evaluation
[J]. Journal of Triticeae Crops, 2006, 26(5): 49-53(in Chinese). 孙家柱, 刘广田, 苏青, 等. 谷蛋白溶涨指数在小麦品质评价中的应用价值分析
[J]. 麦类作物学报, 2006, 26(5): 49-53.

[11] Zheng J M, Wei Y M, Hu X Z, et al. Study on the measurement of the swelling index of glutenin with wheat whole meal samples
[J]. Journal of Triticeae Crops, 2004, 24(2): 31-33(in Chinese). 郑建梅, 魏益民, 胡新中, 等. 全麦粉谷蛋白溶涨指数测定方法研究
[J]. 麦类作物学报, 2004, 24(2): 31-33.

[12] Ma X G, Chen W H, Huang J, et al. Review on the study of high yield wheat in Qinghai province
[J]. Science and Technology of Qinghai, 1994, 4: 46-49(in Chinese). 马晓岗, 陈维翰, 黄坚, 等. 青海春小麦高产研究发展综述
[J]. 青海农林科技, 1994, 4: 46-49.

[13] Liu H T, He Z H, Zhang H G, et al. Processing quality of spring wheat in Qinghai province
[J]. Journal of Triticeae Crops, 2004, 24(2): 38-44(in Chinese). 刘会涛, 何中虎, 张怀刚, 等. 青海省春小麦品种加工品质研究
[J]. 麦类作物学报, 2004, 24(2): 38-44.

[14] Payne P I, Lawrence G J. Catalogue of alleles for the complex gene loci, *Glu-A 1, Glu-B1*, and *Glu-D 1* which code for high-molecular-weight subunits of glutenin in hexaploid wheat
[J]. Cereal Research Communication, 1983, 11: 29-35.

[15] Lagudah E S,Halloran G M. Phylogenetic relationships of Triticum tauschii the D genome donor to hexaploid wheat. I. Variation in HMW subunits of glutenin and gliadins
[J]. Theoretical and Applied Genetics, 1988, 75: 592-598.

[16] Ciaffi M, Lifiandra D, Porceddu E, et al. Storage protein variation in wild emmer wheat (Triticum turgidum ssp dicoccoides) from Jordan and Turkey. I. Electrophoretic characterization of genotypes. Theoretical and Applied Genetics, 1993, 86: 474-480.

[17] Nei M. Analysis of gene diversity in subdivided populations //Proceedings of the National Academy of Sciences of the USA, 1973, 70: 3321-3323.

[18] Nevo E, Payne P I. Wheat storage proteins: diversity of HMW glutenin subunits in wild emmer from Israel.1.Geographical patterns and ecological predictability
[J]. Theoretical and Applied Genetics, 1987, 74: 827-836.

[19] Shewry P R, Gilbert S M, Savage A W J, et al. Sequence and properties of HMW subunit 1Bx20 from pasta wheat (Triticum durum) which is associated with poor end use properties
[J]. Theoretical and Applied Genetics, 2002, 106: 744-750.

[20] Caballero L, Martin L M, Alvarez J B. Intra-and interpopulation diversity for HMW glutein subunits in Spanish spelt wheat
[J].Genetic Resource and Crop Evolution, 2004, 51: 175-181.

[21] Zhao H, Lu S Y, Li Z Z. Inheritance and variation of HMW glutenin subunits and their relationships with other characters in common wheat (Triticum aestivum)
[J]. Journal of Agricultural University of Hebei, 1993, 16(1): 8-12(in Chinese). 赵和, 卢少源, 李宗智. 普通小麦高分子量麦谷蛋白亚基遗传变异及与其它性状的关系
[J]. 河北农业大学学报, 1993, 16(1): 8-12.

[22] Wei Y M, Zheng Y L, Liu D C, et al. Genetic diversity of *Gli-1,Gli-2* and *Glu*-1 alleles in Sichuan wheat landraces
[J]. Acta Botanica Sinica, 2000, 42: 496-501.

[23] Liu Y, Xiong Z Y, He Y G, et al. Genetic diversity of HMW glutenin subunit in Chinese common wheat (Triticum aestivum L) landraces from Hubei province
[J]. Genetic Resource and Rrop Evolution, 2007, 54: 865-874.

本刊中的类似文章

1. 邱英雄,黄爱军,傅承新.明党参的遗传多样性研究[J]. 中国科学院研究生院学报, 2000,38(2): 111-120