


[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [AS](#)
[Indexing](#) | [View Papers](#) | [Aims & Scope](#) | [Editorial Board](#) | [Guideline](#) | [Article Processing Charges](#)
[AS](#) > Vol.2 No.3, August 2011



QTL Mapping for chinese northern-style steamed bread specific volume

PDF (Size: 916KB) PP. 201-207 DOI : 10.4236/as.2011.23028

Author(s)

Peng Wu, Bin Liu, Tao Zhou, Zhuokun Li, Haiyun Du, Jiteng Wang, Jichun Tian

ABSTRACT

In this study, quantitative trait loci (QTLs) with additive effects, epistatic effects for CNSB specific volume in bread wheat (*Triticum aestivum* L.), were studied in cultivars Huapei 3 and Yumai 57 (*Triticum aestivum* L.). The DH population and the parents were planted in 2007 and 2008 in Tai' An and 2008 in Suzhou. QTL analyses were performed using the software of IciMapping v2.2 based on the mixed linear model. Five putative QTLs for CNSB specific volume were detected on 5 chromosomes where single QTLs explained 5.11% to 9.75% of phenotypic variations. All of them had negative effects on specific volume and were contributed by Yumai 57 alleles. Qsv-1B was detected in both environment 1 and 3 with 13.88% and 4.83% phenotypic variations which had positive effects and was transmitted by Huapei 3 alleles. Fourteen pairs of QTLs with epistatic effects were detected for specific volume. Seven major QTLs, Qsv-1B/Qsv-3A, Qsv-2D/Qsv-3A, Qsv-3A/Qsv-5B1, Qsv-1B/Qsv-6D, Qsv-2D/Qsv-4D, Qsv-4A/Qsv-6B and Qsv-3A/Qsv-7D could account for 13.88%, 20.39%, 18.88%, 12.31%, 18.78%, 11.98%, and 17.05% of the phenotypic variation of specific volume. The information obtained in this study will be useful for manipulating the QTLs for CNSB specific volume property by molecular marker-assisted selection (MAS).

KEYWORDS

Wheat; Doubled Haploid; Quantitative Trait Loci; CNSB; Specific Volume

Cite this paper

 Wu, P. , Liu, B. , Zhou, T. , Li, Z. , Du, H. , Wang, J. and Tian, J. (2011) QTL Mapping for chinese northern-style steamed bread specific volume. *Agricultural Sciences*, 2, 201-207. doi: 10.4236/as.2011.23028.

References

- [1] He, Z. H., Liu, A. H., Pe?a, R. J. & Rajaram, S. (2003) Suitability of Chinese wheat cultivars for production of northern style Chinese steamed bread, *Euphytica*. 131: 155– 163
- [2] Guo B. L., Wei Y. M., Zhang G. Q., Yang S. H., Hu X. ZH. (2002) Study on the Quality Judging Methods of Steamed Bread, *Journal of Triticeae Crops*, 22(3): 7~10
- [3] Hai, Y., and Kang, M. H. (2007) Breeding of a new wheat variety Huapei 3 with high yield and early maturing. *Henan Agri. Sci.*, 5: 36?37.
- [4] Nelson, J. C. Andreescu, C., Breseghello, F., Finney, P. L., Gualberto, D. G., Bergman, C. J., Pena, R. J., Perretant, M. R., Leroy, P., Qualset, C. O. & Sorrells, M. E. (2006) Quantitative trait locus analysis of wheat quality traits, *Euphytica*, 149: 145– 159
- [5] Hai, Y., and Kang, M. H. (2007) Breeding of a new wheat variety Huapei 3 with high yield and early maturing. *Henan Agri. Sci.*, 5: 36?37.
- [6] Guo, C. Q., Bai, Z. A., Liao, P. A., and Jin, W. K. (2004). New high quality and yield wheat variety Yumai 57. *China Seed Industry* 4: 54.
- [7] SB/T10139-93. Appendix A, 1993, wheat flour for steamed bread.
- [8] Somers, D. J., Isaac, P., Edwards, K. (2004) A high-density microsatellite consensus map for bread

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[AS Subscription](#)
[Most popular papers in AS](#)
[Publication Ethics Statement](#)
[About AS News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

Downloads: 152,771

Visits: 333,413

Sponsors, Associates, and Links >>

- [2013 Spring International Conference on Agriculture and Food Engineering\(AFE-S\)](#)

- [9] Doerge, R. W. (2002) Multifactorial genetics: Mapping and analysis of quantitative trait loci in experimental populations. *Nature Reviews*, 3: 43-52
- [10] Lincoln, S. E., Daly, M. J. and Lander, E. S. (1993) Constructing genetic maps with MAPMAKER/EXP version 3.0: a tutorial and reference manual. Cambridge: Whitehead Institute for Biomedical Research.
- [11] Kosambi, D. D. (1944) The estimation of map distances from recombination values. *Ann Eugen.* 12: 172-175
- [12] Voorrips, R. E. (2002) MapChart: software for the graphical presentation of linkage maps and QTL. *J Hered* 93: 77-78
- [13] Yang, J., and Zhu, J. (2005) Predicting superior genotypes in multiple environments based on QTL effects. *Theoretical and Applied Genetics*. 110: 1268-1274.
- [14] Wang, D. L., Zhu, J., Li, Z. K., and Paterson, A.H. (1999) Mapping QTLs with epistatic effects and QTL × environment interactions by mixed linear model approaches. *Theoretical and Applied Genetics*. 99 (7): 1255-1264.
- [15] Cao, G., Zhu, J., He, C., Gao, Y., Yan, J., and Wu, P. (2001) Impact of epistasis and QTL × environment interaction on the developmental behavior of plant height in rice (*Oryza sativa* L.). *Theor. Appl. Genet.* 103: 153-160.
- [16] Li, H., Li, Z. and Wang, J. (2008) Inclusive composite interval mapping (ICIM) for digenic epistasis of quantitative traits in biparental populations. *Theoretical and Applied Genetics*, 116: 243-260
- [17] Elangovan, M. R., Rai, B. B., Dholakia, M. D., Lagu, R., Tiwari, R. K., Gupta, V. S. Rao, M. S. and Gupta V. S. (2008) Molecular genetic mapping of quantitative trait loci associated with loaf volume in hexaploid wheat (*Triticum aestivum*). *Journal of Cereal Science*, 47(3): 587-598
- [18] Fan, Y. D., Sun, H. Y., Zhao, J. L., Ma, Y. M., Li, R. J., Li, S.S.H. (2009) QTL mapping for quality traits of northern-style hand-made Chinese steamed bread, *Journal of Cereal Science*. 49: 225– 229
- [19] Zhang K. P., Tian J. C., Zhao L., Wang S. S. (2008) Mapping QTLs with epistatic effects and QTL × environment interactions for plant height using a doubled haploid population in cultivated wheat. *J Genet Genomic.*, 35: 119– 127.