

论文

2Ai-2染色体在小麦部分同源染色体代换背景中的遗传

张悦¹²;林志珊^{1*};曹保久³;郭义强³;王美蛟¹⁴;叶兴国¹;辛志勇¹;徐琼芳¹;郭世华²

1国家作物基因资源和基因改良重大科学工程/农业部作物遗传育种重点开放实验室/中国农业科学院作物科学研究所,北京100081;2内蒙古农业大学农学院,内蒙古呼和浩特010018;3北方民族大学生命科学与生物工程学院,宁夏银川750021;4吉林大学植物科学学院,吉林长春130062

摘要:

用中间偃麦草2Ai-2染色体特异的EST-PCR标记检测5个小麦-中间偃麦草二体异代换系(包括端体代换系)与普通小麦中国春(CS)杂交后代群体,研究外源染色体2Ai-2通过杂种向后代的传递率及其结构变异,并用基因组原位杂交进行验证。结果表明,第二部分同源群不同染色体代换背景对外源染色体传递的影响不同,在2B代换系的杂种中外源染色体或片段显示优先传递,而在2D代换系的杂种中其传递力则较低,2B代换背景更有利于2Ai-2染色体或片段的传递;外源染色体在杂种后代传递过程中会发生变异,在多数组合中,变异出现在着丝粒处;与短臂相比,外源染色体长臂更容易在世代中丢失;端体代换系中的外源染色体端体在杂种后代传递过程中容易丢失,且也会发生结构变异。基因组原位杂交结果证明了分子标记跟踪外源染色体的可靠性。

关键词: 二体异代换系 EST-PCR标记 染色体 传递率 结构变异 基因原位杂交

Genetic Behaviour of Thinopyrum intermedium Chromosome 2Ai-2 in Different Wheat Chromosome Substitution Backgrounds of Group 2

1National Key Facility for Crop Genetic Resources and Genetic Improvement/Key Laboratory of Crop Genetics and Breeding,Ministry of Agriculture/Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, Beijing 100081,China;2 Agricultural College, Inner Mongolia Agricultural University,Hohhot 010018,China;3College of Life Sciences and Bioengineering, North University for Nationalities, Yinchuan 750021,China,4College of Plant Science,Jilin University, Changchun 130062,China

1National Key Facility for Crop Genetic Resources and Genetic Improvement/Key Laboratory of Crop Genetics and Breeding,Ministry of Agriculture/Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, Beijing 100081,China;2 Agricultural College, Inner Mongolia Agricultural University,Hohhot 010018,China;3College of Life Sciences and Bioengineering, North University for Nationalities, Yinchuan 750021,China,4College of Plant Science,Jilin University, Changchun 130062,China

Abstract:

Thinopyron intermedium is one of the important gene sources for high resistances to barley yellow dwarf virus, stripe rust as well as tolerances to cold and drought in wheat (*Triticum aestivum* L.) breeding. Several wheat-*Th. intermedium* addition lines, substitution lines, and translocation lines have been developed as breeding materials, including the 2Ai-2 substitution lines with high resistances to the GPV and GAV strains of barley yellow dwarf virus. The aim of this study was to provide cytogenetical evidence on the behaviour of 2Ai-2 chromosome of *Th. intermedium* in different wheat chromosome substitution backgrounds. Five wheat-alien disomic (or ditelosomic) substitution lines were crossed with common wheat variety Chinese Spring to generate the BC₁ and F₂ populations, and the two populations were detected using EST-PCR markers specific to 2Ai-2 chromosome and genomic *in situ* hybridization (GISH). In the F₂ generation, plants with 2Ai-2 accounted for 83.1% and 82.4% in offsprings of the 2Ai-2 (2B) substitution lines N420 and N439, respectively, which were higher than the expected ratio of 75%; whereas, the observed ratios in offsprings of the 2Ai-2 (2D) substitution lines N431 and N452 were 67.6% and 53.8%, respectively, which were lower than the expected value. Especially, the observed value in the hybrids of N452 was significantly different from the expected value ($P < 0.01$), inferring that the alien chromosome or fragment might be preferentially transmitted into F₂ generation in 2Ai-2 (2B) substitution lines through the corresponding gametes. On the contrary, the transmission ratio of the alien chromosome or fragment was low in 2D-substitution background. It was concluded that the effect of different substitution background on the transfer of the 2Ai-2 chromosome was different. In addition, in both 2B and 2D substitution backgrounds, the transmission ratio of the alien chromosome or

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(389KB)
- ▶ [HTML全文]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 二体异代换系
- ▶ EST-PCR标记
- ▶ 染色体
- ▶ 传递率
- ▶ 结构变异
- ▶ 基因原位杂交

本文作者相关文章

PubMed

fragment was obviously higher through male gametes than female gametes. Furthermore, many plants with 2Ai-2 in F₂ and BC₁ were detected using 2Ai-2-specific EST-PCR markers in a limited region, but not in other region, indicating that the alien chromosome was unstable when it was transmitting from hybrid to subsequent generations. From the results, it was inferred that most chromosome variances occurred near centromere. Compared with the short arm, the long arm of the alien chromosome was lost more often in the next generations. The F₂ plants with 2AS-substitution background (N530) were very few when detected with 2Ai-2S-specific EST-PCR marker(s). The difference between observed and expected values was significant (P < 0.01), suggesting that the alien telosome might be lost frequently. Structure variation of telosome 2Ai-2S was also observed in the offsprings with 2AS-substitution background. GISH results confirmed that the EST-PCR markers can be used effectively in tracing the alien chromosome in wheat background.

Keywords: Disomic substitution lines EST-PCR markers Chromosome Transmission ratio Structure variation

收稿日期 2008-06-30 修回日期 2008-09-03 网络版发布日期 2009-01-15

DOI: 10.3724/SP.J.1006.2009.00424

基金项目:

本研究由国家自然科学基金项目(30571159)资助

通讯作者:

作者简介:

参考文献:

本刊中的类似文章

文章评论 (请注意:本站实行文责自负, 请不要发表与学术无关的内容!评论内容不代表本站观点.)

HTTP Status 404 -
/zwxb/CN/comment/listCommentInfo.jsp

type Status report

Copyright 2008 by 作物学报