2019年第32期总72期

小麦遗传育种专题

本期导读

前沿资讯

1.历时70年从天然状态外小麦收集种子再生的历史表型数据

学术文献

1. 评估小麦天门冬酰胺含量的变异和遗传结构：植物育种如何有助于减少丙烯酰胺前体?

2. 斯卑尔脱小麦可以作为杂交小麦育种的优势群体吗?

3. 巴西小麦育种的进步：发育阶段和生态生理特性的变化

相关专利

1. 一种中强筋优质小麦的育种方法

中国农业科学院农业信息研究所
联系人：唐研;孟静;顾亮亮
联系电话：0531-66657915
邮箱：agri@ckcest.cn
2019年08月12日

前沿资讯

1．Historical phenotypic data from seven decades of seed regeneration in a wheat ex situ collection(历时70年从天然状态外小麦收集种子再生的历史表型数据)

简介：基因库是遗传多样性的宝贵来源，它有助于应对由不断增长的人口、停滞的产量和气候变化引起的未来全球粮食安全问题。然而，基因库表型和基因型特征的缺乏严重制约了其在植物育种中的应用。在田间表型鉴定中，为了保证在周期性再生周期中个体遗传的种子完整性，进行了表型鉴定。本研究提供了12754份春小麦和冬小麦材料的非正交历史数据，这些材料具有开花时间、株高和千粒重等性状，在德国遗传基因库进行了70年的种子再生。在历史气象观测的支持下，根据先前描述的质量评估渠道，删除了异常值。通过这种方法，可以生成和进一步验证再生年份的现成处理表型数据。我们鼓励国际和国家基因库加大建设力度，转型为生物数字资源中心。第一个重要的步骤可能就是打开他们的历史数据宝藏，让科学家和育种者有一个能够学习的机会。

来源：Nature

发布日期:2019-07-29

全文链接:

http://agri.ckcest.cn/file1/M00/06/8D/CsgkOF1CgJqAaF3_AC6ftPoi42A994.pdf

学术文献

1．Assessing the variation and genetic architecture of asparagine content in wheat: What can plant breeding contribute to a reduction in the acrylamide precursor?(评估小麦天门冬酰胺含量的变异和遗传结构：植物育种如何有助于减少丙烯酰胺前体?)

简介：Acrylamide is a potentially carcinogenic substance that is formed in baked products of wheat via the Maillard reaction from carbonyl sources and asparagine. In bread, the acrylamide content increases almost linearly with the asparagine content of the wheat grains. Our objective was, therefore, to investigate the potential of wheat breeding to contribute to a reduction in acrylamide by decreasing the asparagine content in wheat grains. To this end, we evaluated 149 wheat varieties from Central Europe at three locations for asparagine content, as well as for sulfur content, and five important quality traits regularly assessed in bread wheat breeding. The mean asparagine content ranged from 143.25 to 392.75 mg/kg for the different wheat varieties, thus underlining the possibility to reduce the acrylamide content of baked wheat products considerably by selecting appropriate varieties. Furthermore, a moderately high heritability of 0.65 and no negative correlations with quality traits like protein content, sedimentation volume and falling number show that breeding of quality wheat with low asparagine content is feasible. Genome-wide association mapping identified few QTL for asparagine content, the largest explaining 18% of the genotypic variance. Combining these QTL with a genome-wide prediction approach yielded a mean cross-validated prediction ability of 0.62. As we observed a high genotype-by-environment

interaction for asparagine content, we recommend the costly and slow laboratory analysis only for late breeding generations, while selection in early generations could be based on marker-assisted or genomic selection.

来源： Springer

发布日期: 2018-11-01

全文链接:

http://agri.ckcest.cn/file1/M00/06/8D/CsgkOF1CkBeACjKqABVDAyey09o428.pdf

2. Can spelt wheat be used as heterotic group for hybrid wheat breeding?(斯卑尔脱小麦可以作为杂交小麦育种的优势群体吗?)

简介： The feasibility to switch from line to hybrid breeding is currently a hot topic in the wheat community. One limitation seems to be the lack of divergent heterotic groups within wheat adapted to a certain region. Spelt wheat is a hexaploid wheat that can easily be crossed with bread wheat and that forms a divergent genetic group when compared to elite bread wheat. The aim of this study was to investigate the potential of Central European spelt as a heterotic group for Central European bread wheat. We performed two large experimental field studies comprising in total 43 spelt lines, 14 wheat lines, and 273 wheatspelt hybrids, and determined yield, heading time, plant height, resistance against yellow rust, leaf rust, and powdery mildew, as well as protein content and sedimentation volume. Heterosis of yield was found to be lower than that of hybrids made between elite wheat lines. Moreover, heterosis of the quality trait sedimentation volume was negative. Consequently, spelt wheat does not appear suited to be used as heterotic group in hybrid wheat breeding. Nevertheless, high combining abilities of a few spelt lines with elite bread wheat lines make them interesting resources for pre-breeding in bread wheat. Thereby, the low correlation between line per se performance and combining ability of these spelt lines shows the potential to unravel the breeding value of genetic resources by crossing them to an elite tester.

来源： Springer

发布日期: 2018-04-01

全文链接:

http://agri.ckcest.cn/file1/M00/06/8D/CsgkOF1ChTWAV3cZABlx6DTbPXw723.pdf

3. Improvement in Brazilian wheat breeding: changes in developmental phases and ecophysiological traits(巴西小麦育种的进步：发育阶段和生态生理特性的变化)

简介: Understanding the processes responsible for genetic progress in grain yield and relating them to the growth and developmental phases of the wheat plant are essential for improving yield potential. This study aimed to evaluate the duration of developmental phases and eco-physiological traits associated to grain yield in Brazilian wheat cultivars released in different decades. Wheat cultivars released from 1940 to 2009 were evaluated during 2010 and 2011 in Pato Branco, Paraná, Brazil. The length of the following periods was compared: sowing-emergence (SW-EM), emergence-double ridge (EM-DR), double ridge-terminal spikelet (DR-TS), terminal spikelet-anthesis (TS-ANT), anthesis-physiological

maturity (ANT-PM), sowing-anthesis (SW-ANT) and sowing-physiological maturity (SW-PM). Yield components were also measured. Breeding has reduced the days until anthesis by 14.2%, while it has extended the grain-filling period by 7.6%, compared to the first cultivars released in the country, thereby contributing to a significant increase in 1000-grain weight (12.4 and 9.0% in 2010 and 2011, respectively). The TS-ANT phase was the only phase prior to anthesis exhibiting an extension from old to modern cultivars; this phase increased 1.56 °Cd syear−1. Spike fertility index (SFI) showed increases of 37.8 and 23.8% in 2010 and 2011, respectively. Shortening of the time to flowering, shifting of critical phases of wheat development to better environmental conditions (i.e., TS-ANT phase), and selection for shorter cultivars have been directly responsible for the increase in spike dry weight at anthesis (SDWa) and SFI [i.e., grain number (GN)].

来源： Springer

发布日期:2018-03-01

全文链接:

http://agri.ckcest.cn/file1/M00/06/8D/CsgkOF1ChkuALCNMABsE95afVks223.pdf

相关专利

1. 一种中强筋优质小麦的育种方法

简介：本发明涉及的小麦育种的技术领域，特别是涉及一种中强筋优质小麦的育种方法，其提高质量；包括以下步骤：1)、杂交以矮败轮回群体为母本、师栾02- 1为父本进行第一次杂交，获得第一次杂交种子；2)、以第一次杂交种子为母本、济麦22为父本进行第二次杂交，获得第二次杂交种子；3)、第二次杂交种子再与师栾02- 1杂交，得到F1代种子；4)、将F1代种子进行种植选育，选育标准包含：是否含有亚基“5+10”；5)、在F2、F3代对选择出的后代进行KASP标记检测优质亚基，并以此为选育标准。

来源： 国家知识产权局

发布日期:2019-06-28

全文链接:

http://agri.ckcest.cn/file1/M00/06/8D/CsgkOF1CiGeAClwfAANkJZpX8pQ959.PDF