2019年第17期总57期

小麦遗传育种专题

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1．与小麦苗期根系构型相关的KASP标记及其应用

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前沿资讯

1. Diversity of Puroindoline genes and their association with kernel hardness in Chinese wheat cultivars and landraces(中国小麦品种和地方品种中嘌呤基因的多样性及其与籽粒硬度的关系)

简介：籽粒硬度是影响普通小麦碾磨和烘烤品质的一个重要性状。籽粒硬度主要受Pina和Pinb基因的控制。在这里，我们研究了107个中国小麦品种和地方品种中Pina和Pinb等位基因的多样性。在两个田间季节（2016/2017和2017/2018）测定了这些研究材料的籽粒硬度值，2年的数值具有很强的相关性，硬度指标为5.4～91.8。检测到5个已知的Pina-D1等位基因和4个已知的Pinb-D1等位基因。特别是，我们鉴定出一种新的Pinb无效等位基因（被称为Pinb-D1z），其3382-bp的缺失可以被新的分子标记Pina-N5检测到。我们还鉴定出一个含有29-kb缺失的Pina/Pinb双空等位基因，它们是改善籽粒结构的有用基因型。这些群体中最常见的基因型是Pina-D1a/Pinb-D1a和Pina-D1a/Pinb-D1b（分别为39.3%和34.6%），其次是Pina-D1a/Pinb-D1p（13.2%）。本研究与以往研究的基因型比较表明，中国小麦地方品种在Pina基因上的等位基因变异比较多。对小麦籽粒硬度的相关性分析表明，15个Pina-D1等位基因和6个Pinb-D1等位基因可能与普通小麦的硬粒表型有关。值得注意的是，这项研究表明，中国的地方品种是一个宝贵的资源，遗传变异的Puroindoline基因，为研究Puroindoline基因的基因型与表型之间的关系提供了更深入的理解。

来源：Molecular Breeding

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http://agri.ckcest.cn/file1/M00/06/6A/CsgkOFy_xk6AUAuSABfj55oa3cc567.pdf

学术文献

1. Evidences of organic acids exudation in aluminium stress responses of two Madeiran wheat (Triticum aestivum L.) landraces(两个小麦品种铝胁迫反应中有机酸渗出的凭证)

简介：在水培条件下，对两个小麦品种（Triticum aestivum L.）进行了100μm和200μm铝（AL）的水培试验，评估了有机酸渗出在植物对这种金属的反应中所起作用。采用标准试验方法：色素蓝R染色、根伸长和根中胼胝质积累，对原始陆种群体(F0)、F3和单倍体二倍体(DH)进行了评价。获得根系分泌物，以确定苹果酸和柠檬酸在水培培养基中的积累是否是铝暴露的反应。此外，使用5个微卫星标记检测ALMT1基因的存在。标准试验证实，ISOP 76为铝耐受性，ISOP 239为铝敏感性。在100μm铝存在下，ISOP 76比ISOP 239（3.65至7.72 mg/l）释放出更多的苹果酸（12.87至43.33 mg/l）。两种有机酸渗出物的水平在ISOP239中明显低于ISOP76。在200μm铝存在下，ISOP 76 F0表现出较高的根系延伸率（对铝的耐受性较好），而DH系表现出较高的苹果酸含量。在两个地方品种中检测到不同的基因等位基因和启动子。分子差异可以解释有机酸渗出对铝胁迫反应的不同。

来源：Genetic Resources and Crop Evolution

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2. Effect of water stress on germination of some Hungarian wheat landraces varieties(水分胁迫对部分匈牙利小麦品种萌发的影响)

简介：In order to examine germination characters, seedling parameters,water relative content, tolerance index and enzyme activities of seven Hungarian wheat landraces varieties (Tiszadadai, Riscsei, Komloi, Leweucei, Mateteleki, Mikebudai and Nyiradi) under five concentrations of water stress (0, 6, 12, 18, and 24%) of polyethylene glycol(PEG-6000). A laboratory experiment has been conducted through Factorial Experiment in Randomized Complete Block Design (RCBD)with four repetitions at Research Institute of Nyiregyhaza, Hungary. Fromthe obtained results, Leweucei variety was surpassed other studied verities under study and recorded the highest values of all studied characters followed by Mateteleki, Komloi, Nyiradi, Riscsei, Tiszadadai and Mikebudai. Increasing water stress (PEG-6000) from 0 to 6, 12, 18 and 24% significantly reduced germination characters, seedlings parameters, water relative content (WRC), tolerance index and α and β-amylases activities. Generally, under water stress condition, Leweucei and Mateteleki varieties were recorded the highest values of water relative content (WRC), tolerance index (TI) and α and β-amylases activities as well as able to prompt better drought tolerance and could be suggested as a good resource for breeding programs and cultivation under drought stress conditions compared with other wheat landraces varieties.
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3. Genetic improvement of grain quality traits for CIMMYT semi-dwarf spring bread wheat varieties developed during 1965–2015: 50 years of breeding(1965-2015年CIMMYT半矮秆春小麦品种籽粒品质性状遗传改良:50年育种历程)

简介：The Global Wheat Program, now managed by the CGIAR consortium and led by CIMMYT, initiated wheat breeding about 70 years ago in Mexico. Currently, the key objectives are to develop wheat cultivars that have superior grain yield, durable disease resistance, drought and heat tolerance and meet the processing and end-use quality needs for diverse worldwide processing conditions and products. In this study, the genetic gains in grain quality of semi-dwarf spring wheat cultivars developed from 1965 to 2015 by CIMMYT and related breeding programs of national partners in the target areas were examined. Genetic gains for test weight, thousand kernel weight, grain hardness, flour yield, gluten extensibility and protein content were non significant, and these traits remained stable despite grain yield increase over years. Positive genetic gains were found for dough strength related parameters mixograph mixing time (0.026 min. per year), torque (0.93 per year) and

alveograph W (2.31 J*104 per year), and bread-making quality (loaf volume, 1.32 mL per year). We concluded that genetic gains for grain yield of CIMMYT spring wheat cultivars demonstrated by previous studies were not at the expense of processing and end-use quality traits. Both types of traits have been improved in the last 50 years through direct selection ensuring the acceptability of CIMMYT germplasm in the target countries by all wheat value chain stakeholders.

来源： Field Crops Research

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http://agri.ckcest.cn/file1/M00/06/6A/CsgkOFy_OuGALEo8AAkJ51227mk568.pdf

相关专利

1．与小麦苗期根系构型相关的KASP标记及其应用

简介： 本发明涉及一个与小麦苗期根系构型相关的SNP位点，该位点位于小麦4D染色体16 .64Mb位置处的基因的第36位。本发明还基于该SNP位点开发了KASP标记专用引物、包含该KASP标记引物的试剂盒以及利用该KASP标记引物鉴定或辅助鉴定小麦根系性状的方法。本发明的KASP标记专用引物可用于鉴定待测小麦的基因型，根据待测小麦的基因型可确定AA基因型的待测小麦的根系性状优于AG或GG基因型的待测小麦，进而用于筛选苗期根系性状优良的小麦品种。

来源： 国家知识产权局专利检索与分析

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