2019年第5期总45期

小麦遗传育种专题

本期导读

前沿资讯

1．低温胁迫对小麦在拔节和孕穗期生物量积累的响应

学术文献

1．欧洲小麦对极端天气的敏感度

2．矮化基因Rht对小麦籽粒微量营养素浓度的遗传影响

相关专利

1．一种杂交小麦育种方法

科技报告

1．气候变化对小麦物候的影响取决于品种的变化

中国农业科学院农业信息研究所
联系人：唐研
联系电话：0531-66657915
邮箱：agri@ckcest.cn
2019年02月04日

前沿资讯

1. Response of biomass accumulation in wheat to low-temperature stress at jointing and booting stages(低温胁迫对小麦在拔节和孕穗期生物量积累的响应)

简介：气候变化导致极端低温事件的频率、强度和持续时间不断增强，对中国小麦生产构成严重威胁。为了更好地了解低温对小麦光合作用和产量的影响，在两个不同的冷敏感冬小麦品种上，分别在拔节和孕穗期的5个日最高/最低温度水平和第2、4、6天3个温度持续时间，进行了为期2年的植物体温度控制试验。除对拔节期平均净同化率（MNAR）的影响外，低温水平对平均叶面积指数（MLAI）、平均净同化率（MNAR）、收获指数（HI）、单株生物量（BPPM）和单株籽粒产量（GYPP）均有显著的负效应，而光合持续时间（D）（拔节期除Yangmai16外）为显著的负效应。低温持续时间及其与低温水平的相互作用对MLAI、MNAR、HI、BPPM和GYPP都有负面影响，但只有低温持续时间对HI、BPPM和GYPP的影响以及对BPPM和GYPP的相互作用起到了显著影响。此外，BPPM和GYPP在孕穗期对低温的敏感性高于拔节期。此外，累积冷度日（ACDD）与MLAI、MNAR、HI、BPPM和GYPP呈显著的负线性关系，而ACDD和D在两个品种中均呈显著的正线性关系。在两个品种中，BPPM 对GYPP变异的贡献均大于HI。然而，对于生物量而言，从低温处理的第一天到成熟期（BPPT-M），主要的变化是由接合处低温时的MLAI和启动时低温的mNAR引起的。这些结果可以支持冷胁迫下作物模型算法的改进，有助于提高小麦的耐寒性。

来源：Environmental and Experimental Botany

发布日期:2019-01-01

全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxOpiKASyQwABOHwFLO56w373.pdf

学术文献

1. Sensitivity of European wheat to extreme weather(欧洲小麦对极端天气的敏感度)

简介：The frequency and intensity of extreme weather is increasing concomitant with changes in the global climate change. Although wheat is the most important food crop in Europe, there is currently no comprehensive empirical information available regarding the sensitivity of European wheat to extreme weather. In this study, we assessed the sensitivity of European wheat yields to extreme weather related to phenology (sowing, heading) in cultivar trials across Europe (latitudes 37.21° to 61.34° and longitudes −6.02° to 26.24°) during the period 19912014. All the observed agro-climatic extremes (≥31 °C, ≥35 °C, or drought around heading; ≥35 °C from heading to maturity; excessive rainfall; heavy rainfall and low global radiation) led to marked yield penalties in a selected set of European cultivars, whereas few cultivars were found to with no yield penalty in such conditions. There were no European wheat cultivars that responded positively (+10%) to drought after sowing, or frost during winter (−15 °C and −20 °C). Positive responses to extremes were often shown by cultivars associated with

specific regions, such as good performance under high temperatures by southern-origin cultivars. Consequently, a major future breeding challenge will be to evaluate the potential of combining such cultivar properties with other properties required under different growing conditions with, for example, long day conditions at higher latitudes, when the intensity and frequency of extremes rapidly increase.

来源： Field Crops Research

发布日期: 2018-06-01

全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxPuRmAH18XAAycC9rQHOA277.pdf

2. Genetic impact of Rht dwarfing genes on grain micronutrients concentration in wheat(矮化基因Rht对小麦籽粒微量营养素浓度的遗传影响)

简介： Wheat is a major staple food crop providing about 20% of dietary energy and proteins, and food products made of whole grain wheat are a major source of micronutrients like Zinc (Zn), Iron (Fe), Manganese (Mn), Magnesium (Mg), Vitamin B and E. Wheat provides about 40% intake of essential micronutrients by humans in the developing countries relying on wheat based diets. Varieties with genetically enhanced levels of grain micronutrient concentrations can provide a cost-effective and sustainable option to resource poor wheat consumers. To determine the effects of commonly deployed dwarfing genes on wheat grain Zn, Fe, Mn and Mg concentrations, nine bread wheat (Triticum aestivum) and six durum wheat (T. turgidum) isoline pairs differing for Rht1 (= Rht-B1b) and one bread wheat pair for Rht2 (= Rht-D1b) dwarfing genes were evaluated for three crop seasons at N.E. Borlaug Research Station, Cd. Obregon, Sonora, Mexico. Presence of dwarfing genes have significantly reduced grain Zn concentration by 3.9 ppm (range 1.9-10.0 ppm), and Fe by 3.2 ppm (range 1.0-14.4 ppm). On the average, about 94 ppm Mg and 6 ppm Mn reductions occurred in semidwarf varieties compared to tall varieties. The thousand kernel weight (TKW) of semidwarf isolines was 2.6 g (range 0.7-5.6 g) lower than the tall counterparts whereas the plant height decreased by 25 cm (range 1637 cm). Reductions for all traits in semidwarfs were genotype dependent and the magnitude of height reductions did not correlate with reductions in micronutrient concentrations in wheat grain. We conclude that increased grain yield potential of semidwarf wheat varieties is associated with reduced grain micronutrient concentrations; however, the magnitude of reductions in micronutrients varied depending on genetic background and their associated pleiotropic effect on yield components.

来源： Field Crops Research

发布日期: 2017-12-01

全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxPvLOAUxWOAATiYep9PGc320.pdf

相关专利

1．一种杂交小麦育种方法

简介：本发明公开了一种杂交小麦育种方法，涉及小麦育种技术领域。包括以下步骤：选用适宜当地种植的抗病虫和抗倒的小麦种子在室内进行萌芽培养，在小麦春化阶段，筛选出在-10℃～2℃的温度范围内仍能发芽的小麦种子，然后在病感和盐碱条件下进行种植和生长，并得到F1代种子；以F1代种子为父本，选择野生小麦为母本进行杂交，并得到F2代种子；将F2代种子在室内进行萌芽培养，在小麦春化阶段，筛选出在-10℃～2℃的温度范围内仍能发芽的小麦种子。本发明通过将抗病虫和抗倒的小麦与基因突变后的野生小麦进行杂交，然后再与高产稳定的小麦进行杂交，培育出了抗冻、抗害和生命力顽强的高产质量和产量。

来源：国家知识产权局专利检索及分析

发布日期:2018-07-20

全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxPvWWAFxFjAAOMGzf3BzU931.PDF

科技报告

1．Climate change effect on wheat phenology depends on cultivar change(气候变化对小麦物候的影响取决于品种的变化)

简介：作物物候变化被认为是气候变化的一个重要生物指标，近年来气候变暖的趋势促进了作物物候学的进步。关于播种日期和品种的变化对作物物候学长期趋势的影响，尤其是对冬小麦等冬季作物的影响，人们知之甚少。在这里，我们分析了西德的一个长期（1952-2013）物候观测数据集和两年实地试验的观测结果，以直接比较1950年至2006年期间发布的冬小麦品种物候数据。我们发现现代冬小麦品种从出苗到开花所需的温度总和比50年代和60年代的品种下降了14-18%。利用田间观测参数的物候模型得到的开花日变化趋势表明，平均温度和品种性状的变化对开花日变化的影响相似，而播种日变化的影响可以忽略不计。我们的结论是，气候变化影响评价中常用的单品种高估了冬小麦对气温升高的敏感性，这意味着气候变化影响的研究应该考虑品种的变化。

来源：Nature

发布日期:2018-03-20

全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxPtl-AYE4GAD3KWOP7hjI634.pdf