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小麦遗传育种专题

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2019年10月14日

前沿资讯

1. Plant biotransformation of T2 and HT2 toxin in cultured organs of Triticum durum Desf(硬粒小麦培养器官T2、HT2毒性物质的生物转化)

简介：本研究旨在通过培养植物器官，研究5个硬粒小麦品种对T2和HT2毒性物质的吸收和生物转化。7日后，T2毒性物质几乎全部被吸收，与植物同时形成HT2,而未受感染的植物器官对HT2的吸收较慢。非靶向质谱分析可以识别出大量的一期和二期代谢物，结果是26个T2和23个HT2代谢物加上试验性的同分异构体。首次揭示了小麦中一种新的潜伏霉菌毒素3-乙酰-HT2-葡萄糖苷。体外方法证实了它的潜力，即研究植物代谢在潜伏真菌毒素生物合成中的贡献，并预见生物催化工具的发展，以开发类似自然的混合物作为参考材料。

来源：Nature

发布日期:2019-10-04

全文链接:

http://agri.ckcest.cn/file1/M00/00/02/CsgkOV2cNmuACn9aAC05-2PNpOo884.pdf

2. Manganese protects wheat from the mycotoxin zearalenone and its derivatives(锰可以保护小麦不受玉米烯酮霉菌毒素及其衍生物的感染)

简介：Searching for factors that reduce zearalenone (ZEN) toxicity is an important challenge in wheat production, considering that this crop is a basic dietary ingredient. ZEN, absorbed by cells, is metabolized into α-zearalenol and α-zearalanol, and this study focused on the function of manganese ions as potential protectants against the mycotoxins. Stress effects were invoked by an application of 30 μM ZEN and its derivatives. Manganese ions were applied at 100 μM, not stress-inducing concentration. Importance of the biomembrane structures in the absorption of the mycotoxins was demonstrated in in vitro wheat calli and on model membranes. ZEN showed the greatest and α-zearalanol the smallest stressogenic effect manifested as a decrease in the calli growth. This was confirmed by variable increase in antioxidant enzyme activity. Mn ions added to the toxin mixture diminished stressogenic properties of the toxins. Variable decrease in total lipid content and the percentage of phospholipid fraction detected in calli cells exposed to ZEN and its metabolites indicated significance of the membrane structure. An analysis of physicochemical parameters of model membranes build from phosphatidylcholine, a basic lipid in native membranes, and its mixture with the tested toxins made by Langmuir technique and verified by Brewster angle microscopy, confirmed variable contribution of ZEN and its derivatives to the modification of membrane properties. The order of toxicity was as follows: ZEN ≥ α-zearalenol > α-zearalanol. Manganese ions present in the hydrophilic phase interacted with polar lipid groups and reduced the extent of membrane modification caused by the mycotoxins.

来源：Nature

发布日期:2019-10-02

全文链接:

http://agri.ckcest.cn/file1/M00/0E/CB/CsgkOF2cOgGAIS_GACS84oOYNzM457.pdf

3. RNAseq analysis reveals drought-responsive molecular pathways with candidate genes and putative molecular markers in root tissue of wheat(RNAseq分析揭示了小麦根系组织中具有候选基因和假定分子标记的干旱响应分子途径)

简介：干旱是小麦生产的主要阻碍之一，传统育种和标记辅助的QTL基因渗入收效甚微。现有的小麦基因组和RNA序列数据可以通过发现推测的候选基因和标记来破译新的抗旱机制。干旱首先是由根系组织感知的，但关于根系如何应对干旱胁迫的信息却是有限。在本研究中，我们使用了两种对比基因型，即NI543941(耐旱)和WL711(不耐旱)，得到了约78.2 GB的小麦根系对干旱的响应数据。共获得45139个DEGs、13820个TF、288个miRNAs、640个通路和435829个可能的标记。研究发现，通过对18个差异调节基因和190个序列变异(173个SNPs和17个InDels)的小麦根系3B染色体上的两个干旱响应型QTL的分析，可以将这些数据用于QTL的QTN改良。基因调控网络显示69个中心基因整合了ABA依赖和独立的调控途径，控制干旱、根系生长、摄取调节、嘌呤代谢、硫胺代谢和抗生素的调控途径、气孔关闭和衰老。在18个不同的小麦品种中对11个SSR标记进行了验证。为了有效地利用这些发现，开发了web基因组资源。我们报道了小麦根系的RNA-Seq方法，描述了大田干旱条件下的干旱响应机制以及基因组资源，为提高小麦产量提供了依据。

来源：Nature

发布日期:2019-09-26

全文链接:

http://agri.ckcest.cn/file1/M00/00/02/CsgkOV2cLZyAT3iMACh2Pg2Y_7c005.pdf

学术文献

1. Alpha-tocopherol fertigation confers growth physio-biochemical and qualitative yield enhancement in field grown water deficit wheat (Triticum aestivum L.)(生育酚施肥能提高田间缺水小麦的生理生化生长和产量)

简介：Water stress is a major problem to fulfill the world food demand and to solve the problem of malnutrition. Different strategies are being used to solve these problems including the fertigation of plants with different biochemical at different growth stages. The present study was conducted for the induction of drought tolerance in field grown wheat for better yield and nutritional quality through foliar spray of α-tocopherol (α-Toc) at start of reproductive stage. Water stress was maintained based on number of irrigation. Three levels of α-Toc 0.001, 0.01 and 0.1 mM were applied as foliar spray. Water stress significantly reduced the biomass production that associated with the decreased photosynthetic pigments, water relation, photosynthetic efficiency, but increased the lipid peroxidation, leaf relative membrane permeability, activities of antioxidant enzymes and the contents of phenolic, flavonoids, α-toc and ASA. Water stress also negatively effected the different yield attributes and seed nutrient quality. Foliar fertigation of wheat plants with α-Toc significantly improved

the water stress tolerance of wheat plants in term of improvement in growth and seed yield associated with improved water relations, photosynthetic efficiency, contents of photosynthetic pigments and improvement in antioxidative defence mechanism (enzymatic and non-enzymatic antioxidants). Fertigation of water stressed wheat plants with α-Toc also improved the seed nutritional quality in terms of the contents of seed phenolics, flavonoids, activities of antioxidant enzymes and the content of α-, β- and γ-tocopherols. In conclusion, it was found that fertigation of water stressed wheat plants not only improved the water stress tolerance but also improved the seed yield and nutritional quality that will not only be helpful for the improvement in wheat yield that also be a step to solve the problem of malnutrition through the bio-fertification of α-Toc.

来源： Nature

发布日期:2019-09-09

全文链接:

http://agri.ckcest.cn/file1/M00/00/02/CsgkOV2cL2OAKOURAF4L1YrW31o257.pdf

相关专利

1．一种多抗广适选择混合小麦育种方法

简介：本发明涉及一种多抗广适选择混合小麦育种方法，属于农作物育种领域，该方法是在小麦杂种F2代开始选株，中选单株考种后取单穗脱粒混合，播种F3代；F3代继续选株，中选单株考种后取单穗脱粒混合，播种F4代；F4代选株，考种，单株脱粒后不再混合，而是开始种植株系鉴定；若株系集成较多目标性状且单株间性状表现较一致，可定为重点株系提升小区鉴定试验并保留3- 5个单株保纯；若株系性状分离，则在株系中再选单株，下年度再行种植株系鉴定，直至获取稳定世代。最终，在稳定世代，进行多点品比鉴定。该方法在杂种后代选种时更好地保留优良基因，早期选择优异单株，淘汰不良个体，提高育种效率，缩短育种年限。

来源： 国家知识产权局

发布日期:2019-07-05

全文链接:

http://agri.ckcest.cn/file1/M00/0E/CB/CsgkOF2cPb-AXIs-AAeJUllN3KA922.PDF