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前沿资讯

1. Big, hairy tomatoes（世界蔬菜中心选育出具有显著抗虫性的多毛番茄新品种）

简介：植物表皮的毛状体有多种用途，如减少蒸腾作用、保护脆弱的组织免受烈日或霜冻侵害、锁住水分、干预害虫活动或采食等。日前，世界蔬菜中心的育种人员用一种选育自野生近缘种的番茄杂交种培育出藤蔓多毛、抗虫害的番茄植株。

研究人员深入研究了世界蔬菜基因银行番茄基因中多腺番茄（S. galapagense）、醋栗番茄（S. pimpinellifolium）、契斯曼尼番茄（S. cheesmanii）和樱桃番茄（S. lycopersicum var. cerasiforme）的基因，还分析了美国农业部提供的350多种基因，确定了多腺番茄的七种基因以及醋栗番茄、契斯曼尼番茄和樱桃番茄这三种番茄中各有一种基因具有较高的抗虫害性。2016年，在繁衍自栽培种和野生种杂交的2500棵F2植株中，研究人员评估了多腺番茄的毛状体类型和密度，从中挑选出200棵IV型毛状体密度不同的番茄，并运用标记辅助选择法选出那些已知有抗病基因的番茄。

研究人员对符合毛状体/抗病基因要求的30棵F2植株进行了测试，以“无选择”方式让所有植株都接触粉虱。其中5棵植株表现出强大的粉虱抗性，然后这些植株再和易受侵害的番茄株系进行回交。通过杂交，繁殖出继承了亲本优良特性的新株系。这些植株再通过回交或繁殖来形成亲本的一种，以巩固某种特性。如此经过几代的回交和多年的努力才能实现育种目标。

来源：World Vegetable Center

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全文链接：

https://avrdc.org/big-hairy-tomatoes/

学术文献

1. Genome-wide characterization and expression profiling of PDI family gene reveals function as abiotic and biotic stress tolerance in Chinese cabbage (Brassica rapa ssp pekinensis)（PDI家族基因的全基因组鉴定与表达谱揭示了其在大白菜中对于非生物胁迫和生物胁迫功能和作用）

简介：Background: Protein disulfide isomerase (PDI) and PDI-like proteins contain thioredoxin domains that catalyze protein disulfide bond, inhibit aggregation of misfolded proteins, and function in isomerization during protein folding in endoplasmic reticulum and responses during abiotic stresses.Chinese cabbage is widely recognized as an economically important, nutritious vegetable, but its yield is severely hampered by various biotic and abiotic stresses. Because of, it is prime need to identify those genes whose are responsible for biotic and abiotic stress tolerance. PDI family genes are among of them. Results: We have identified 32 PDI genes from the Br135K microarray dataset, NCBI and BRAD database, and in silico characterized their sequences. Expression profiling of those genes was performed using cDNA of plant samples imposed to abiotic stresses; cold, salt, drought and ABA

(Abscisic Acid) and biotic stress; Fusarium oxysporum f. sp. conglutinans infection. The Chinese cabbage PDI genes were clustered in eleven groups in phylogeny. Among them, 15 PDI genes were ubiquitously expressed in various organs, while 24 PDI genes were up-regulated under salt and drought stress. By contrast, cold and ABA stress responsive gene number were ten and nine, respectively. In case of F. oxysporum f. sp. conglutinans infection 14 BrPDI genes were highly up-regulated. Interestingly, BrPDI11 gene was identified as putative candidate against abiotic (salt and drought) and biotic stresses, BrPDI52 gene for ABA stress, and BrPDI14, 61 and 92 were putative candidate genes for both cold and chilling injury stresses. Conclusions: Our findings help to elucidate the involvement of PDI genes in stress responses, and they lay the foundation for functional genomics in future studies and molecular breeding of Brassica rapa crops. The stress-responsive PDI genes could be potential resources for molecular breeding of Brassica crops resistant to biotic and abiotic stresses.

来源：BMC Genomics

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全文链接：

http://agri.ckcest.cn/ass/b582ba01-1f65-4c23-961f-a4e340cd33b6.pdf

2. Genome-wide survey indicates diverse physiological roles of the turnip (Brassica rapa var. rapa) calcium-dependent protein kinase genes(全基因组调查表明芜青中钙依赖性蛋白激酶基因具有多样化的生理作用)

简 介：Calcium-dependent protein kinases (CDPKs) as crucial sensors of calcium concentration changes play important roles in responding to abiotic and biotic stresses. In this study, 55 BrrCDPK genes, which were phylogenetically clustered into four subfamilies, were identified. Chromosome locations indicated that the CDPK family in turnip expanded by segmental duplication and genome rearrangement. Moreover, gene expression profiles showed that different BrrCDPKs were expressed in specific tissues or stages. Transcript levels of BrrCDPKs indicated that they were involved in abiotic and biotic stresses and that paralogs exhibited functional divergence. Additionally, we identified 15 Rboh genes in turnip; the results of yeast two-hybrid analysis suggested that BrrRbohD1 interacted only with BrrCDPK10 and that BrrRbohD2 interacted with BrrCDPK4/7/9/10/17/22/23. Most of the genes play an important role in pst DC3000 defense by regulating the accumulation of H2O2 and stomatal closure. Our study may provide an important foundation for future functional analysis of BrrCDPKs and reveal further biological roles.

来源：SCIENTIFIC REPORTS

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全文链接：

http://agri.ckcest.cn/ass/78e51cca-838e-4949-b2b1-5a509c199a94.pdf

3. Genome-wide identification of Cd-responsive NRAMP transporter genes and analyzing expression of NRAMP 1 mediated by miR167 in

Brassica napus(镉响应性NRAMP转运蛋白基因的全基因组鉴定及甘蓝型油菜miR167介导的NRAMP1表达)

简介：In plants, metal transporters are responsible for metal uptake, translocation and homeostasis. These metals include essential nutrients such as zinc (Zn) and manganese (Mn) or non-essential metals like cadmium (Cd) and lead (Pb). Although a few metal transporters have been well characterized in model plants, little is known about their functionality in rapeseed (Brassica napus). In the study, 22 NRAMP transporter genes from B. napus genome were identified and annotated using bioinformatics and high-throughput RNA-sequencing (RNA-seq). Based on the sequence identity, these NRAMP transporters can be classified into 6 subfamilies. RNA-seq analysis revealed that 19 NRAMP transporters were detected and some of the genes were well confirmed by qRT-PCR. Ten NRAMP transporters (45.5%, 10/22) were found to be differentially expressed (> 2 fold change, $p < 0.05$) under Cd exposure. As an example, we specified expression of BnNRAMP1b under Cd exposure. BnNRAMP1b is a constitutive gene expressing throughout all development stages including seedlings, vegetative tissue, flowers and siliques. Expression of BnNRAMP1b can be strongly induced in seedlings exposed to 80, 160 and 240 μM Cd. To define whether BnNRAMP1b was specific for Cd transport, a yeast (wild-type, BY4741) system with its mutants (ycf1, zrc1, and smf1) defective in transport activity of Cd, Zn and Mn, respectively were tested. Compared to empty vectors (pYES2), cells carrying BnNRAMP1b can rescue the transport functions. As a consequence, excess Cd, Zn and Mn were taken in the cells, which led to metal toxicity, suggesting that BnNRAMP1b is responsible for transport of these metals in B. napus. Using our previously created degradome datasets, we found that BnNRAMP1b could be cleaved by miR167, suggesting that BnNRAMP1b is a target of miR167 in B. napus. The contrasting expression pattern of BnNRAMP1b and miR167 under Cd stress supported the post-transcriptional regulation of BnNRAMP1b by miR167.

来源：Biometals

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全文链接：

http://agri.ckcest.cn/ass/dd109bb8-b92e-4294-8c5b-565fd14467e9.pdf

4. Identification of Candidate Genes for Calcium and Magnesium Accumulation in Brassica napus L. by Association Genetics(通过关联遗传学鉴定甘蓝型油菜中Ca和Mg积累的候选基因)

简介：Calcium (Ca) and magnesium (Mg) are essential plant nutrients and vital for human and animal nutrition. Biofortification of crops has previously been suggested to alleviate widespread human Ca and Mg deficiencies. In this study, new candidate genes influencing the leaf accumulation of Ca and Mg were identified in young Brassica napus plants using associative transcriptomics of ionomics datasets. A total of 247 and 166 SNP markers were associated with leaf Ca and Mg concentration, respectively, after false discovery rate correction and removal of SNPs with low second allele frequency. Gene expression markers at similar positions were also associated with leaf Ca and Mg concentration, including loci on chromosomes A10 and C2, within which lie previously identified transporter genes ACA8

and MGT7. Further candidate genes were selected from seven loci and the mineral composition of whole Arabidopsis thaliana shoots were characterized from lines mutated in orthologous genes. Four and two mutant lines had reduced shoot Ca and Mg concentration, respectively, compared to wild type plants. Three of these mutations were found to have tissue specific effects; notably reduced silique Ca in all three such mutant lines. This knowledge could be applied in targeted breeding, with the possibility of increasing Ca and Mg in plant tissue for improving human and livestock nutrition.

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http://agri.ckcest.cn/ass/ff538369-15ab-4a04-b142-048dcecfae1b.pdf