2022年第21期总344期

蔬菜育种专题

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2022年5月23日

前沿资讯

1．Hortic Res ｜利用基于单倍型分析的方法对番茄的历史和驯化过程进行深入了解

简介：作物在驯化过程中逐渐改变了其野生状态下的形态、生理和遗传性状，一方面向着满足于人类的需求和偏好方向发展，另一方面造就了不同地理区域之间复杂的迁移和信息交流，于是逐渐产生了栽培物种。番茄（Lycopersicon esculentum）的起源中心位于南美洲的安第斯山脉，在秘鲁、厄瓜多尔等地广泛分布，有证据表明，番茄的两个野生种SP和SL参与了物种驯化，其中SL又包含了野生半驯化的SLC变种和SLL栽培变种。作为世界上最重要的栽培作物之一，番茄驯化、迁移和选择的过程值得去深入研究。

近日，Horticulture Research 在线发表了西班牙瓦伦西亚理工大学农业多样性保护和改善研究所（COMAV）以及美国乔治亚大学合作撰写的题为 Haplotype analyses reveal novel insights into tomato history and domestication driven by long-distance migrations and latitudinal adaptations 的研究论文。该成果利用基于Procrustes和单倍型分析自动分类的新方法对番茄复杂的驯化和进化史提出了新的见解，对研究其它作物复杂的驯化迁移史提供了参考。本研究得出的驯化模型得到了传统种群遗传指数、参数统计模型以及形态学和种质基本数据的支持。

来源：园艺研究

发布日期:2022-05-13

全文链接:

http://agri.ckcest.cn/file1/M00/10/03/CsgkOGKEorKAfIU-ACws6ATeZIs375.pdf

学术文献

1．Effects of Iron Deficiency Stress on Plant Growth and Quality in Flowering Chinese Cabbage and Its Adaptive Response(缺铁胁迫对开花大白菜植株生长和品质的影响及其适应性响应)

简介：Iron (Fe) plays an important role in the growth and development of plants. The effects of different Fe concentrations, 1-aminocyclopropane-1-carboxylic acid (ACC), and cobalt chloride (Co^{2+}) treatments on plant growth, quality and the adaptive response to Fe deficiency stress were investigated in flowering Chinese cabbage. The results revealed that Fe deficiency stress inhibited plant growth. The contents of vitamin C, soluble protein, and soluble sugar in leaves and stalks were significantly reduced under Fe deficiency stress, while the content of cellulose and nitrate was increased. Fe deficiency stress clearly reduced the net photosynthetic rate and nitrate reductase activity in the leaves. The balance system of active oxygen metabolism was destroyed due to Fe deficiency, resulting in the decrease in catalase activity, superoxide dismutase activity of roots and leaves, and peroxidase (POD) activity of leaves, while POD activity in roots and malonaldehyde content in roots and leaves were significantly increased. The treatments of Fe deficiency and ACC significantly reduced the pH value of the root medium, promoted the release of ethylene, and increased Fe^{3+} reductase activity, while Co^{2+} treatment showed results that were the opposite to those of Fe deficiency

and ACC treatments. Thus, Fe deficiency stress affected nitrogen metabolism, photosynthesis, reactive oxygen metabolism, pH of root medium, and Fe^{3+} reductase activity, which was related to physiological adaptive response and tolerance mechanisms. We also found that ethylene could be involved in regulating the adaptive response to Fe deficiency stress in flowering Chinese cabbage.

来源：Agronomy

发布日期:2022-04-02

全文链接:

http://agri.ckcest.cn/file1/M00/10/03/CsgkOGKEnYeAEw62ABQsqUlMCe0602.pdf

2. Genome-Wide Association Analyses Reveal Candidate Genes Controlling Harvest Index and Related Agronomic Traits in Brassica napus L.(全基因组关联分析揭示了控制甘蓝型油菜收获指数和相关农艺性状的候选基因)

简介：Harvest index (HI) is a complex and vital agronomic trait that is closely related to the economic benefits of rapeseed. In this study, we measured the HI and 13 HI-related agronomic traits of 104 core breeding lines of rapeseed during 3 years and sequenced the populations using the Bnapus50K array. The phenotypic analyses showed the complex connections among HI and other traits. A total of 212 significant SNPs related to the traits and 22 stable SNPs were identified. Four SNPs, A01_1783685 (PH and SYP), C06_26638717 (PH and NSS), C03_4731660 (MIL and MINS), and C09_36899682 (PH and BYP), were identified as potential pleiotropic loci. Compared to previous reports, 49 consensus loci were obtained that were related to PH, TSW, NSP, BAI, NSS, SL, BN, MINS, SYP, and BYP. Twelve stable SNPs were detected as promising novel loci related to BN (A05_19368584 and A05_19764389), SL (A06_23598999, A06_23608274, and C07_38735522), PH (C04_47349279, C04_47585236, and C09_36899680), MINS (C05_6251826), NSS (C06_22559430 and C06_22570315), and HI (C05_6554451). In addition, 39 putative genes were identified in the candidate intervals. This study provides novel insights into the genetic mechanisms of HI and HI-related traits, and lays a foundation for molecular marker development and casual gene cloning to improve the harvest index of rapeseed.

来源：Agronomy

发布日期:2022-03-27

全文链接:

http://agri.ckcest.cn/file1/M00/03/31/CsgkOYbbUoaAA3UeAEZUGCM97Z0320.pdf

3. Individual and Interactive Effects of Multiple Abiotic Stress Treatments on Early-Season Growth and Development of Two Brassica Species(多种非生物胁迫处理对两种芸苔属植物早季生长发育的个体和交互影响)

简介：Potential global climate change-related impacts on crop production have emerged as a major research priority and societal concern during the past decade. Future changes, natural

and human-induced, projected in the climate have implications for regional and global crop production. The simultaneous occurrence of several abiotic stresses instead of stress conditions is most detrimental to crops, and this has been long known by farmers and breeders. The green leafy vegetables of the Brassicaceae family have especially gained attention due to their many health benefits. However, little information is available about abiotic stress's effects on Brassica vegetables' growth and development. An experiment was conducted on two Brassica species: B. oleracea L. var. acephala WINTERBOR F1 (hybrid kale) and B. juncea var. GREEN WAVE OG (mustard greens). Seven treatments were imposed on the two brassica species in soil-plant-atmosphere-research (SPAR) units under optimum moisture and nutrient conditions, including a control treatment (optimal temperature and UV-B conditions at ambient CO_2 levels), and six treatments where stresses were elevated: CO_2, UV-B, temperature (T), CO_2+UV-B, CO_2+T, and CO_2+UV-B+T. Above- and below-ground growth parameters were assessed at 26 d after sowing. Several shoot and root morphological and developmental traits were evaluated under all the treatments. The measured growth and development traits declined significantly under individual stresses and under the interaction of these stresses in both the species, except under elevated CO_2 treatment. All the traits showed maximum reductions under high IV-B levels in both species. Leaf area showed 78% and 72% reductions, and stem dry weight decreased by 73% and 81% in kale and mustard, respectively, under high UV-B levels. The increased CO_2 concentrations alleviated some deleterious impacts of high temperature and UV-B stresses. The results of our current study will improve our understanding of the adverse effects of environmental stresses on the early-season growth and development of two Brassica species.

来源：Agriculture

发布日期:2022-03-23

全文链接:

http://agri.ckcest.cn/file1/M00/10/03/CsgkOGKEoTOAVZsIABru17vyMxU266.pdf

4．Silicon enhanced the resistance of Chinese cabbage (Brassica rapa L. ssp. pekinensis) to ofloxacin on the growth, photosynthetic characteristics and antioxidant system(硅提高了大白菜（Brassica rapa L. ssp. pekinensis）对氧氟沙星的抗性，提高了其生长、光合特性和抗氧化系统)

简介：The negative impact of the misuse of antibiotics on agriculture and human health has become a popular research topic with the increasing usage of antibiotics; however, little information is available about the mechanisms of OFL (ofloxacin) and Si (silicon). In this experiment, we applied 7 OFL concentrations to two Chinese cabbage cultivars (Qinghua and Biyu) to screen proper OFL concentrations. OFL concentrations of 0, 1, 2.5 and 5 mg L^{-1} were selected for the subsequent test and 1.2 mmol L^{-1} Si was used as mitigation. The results showed that Biyu suffered more damage than Qinghua and the injury degree increased in a concentration-dependent manner. With increasing OFL concentrations, the photosynthetic fluorescence was weakened significantly; under 1, 2.5 and 5 mg L^{-1} OFL, the Pn reduced by 5.35%, 35.92% and 43.62% in Qinghua and 33.98%, 41.94% and 64.66% in Biyu,

respectively. The production rate of O_2^-, H_2O_2 and the MDA content were increased and Biyu appeared higher increase rates. In addition, the antioxidant enzymes contents first increased and then decreased and that of Qinghua increased more than Biyu. Si ensured the growth under OFL and protected its photosynthetic ability. Under the OFL1+Si, OFL2.5 + Si and OFL5+Si treatments, Pn increased by 3.91%, 15.95 and 15.69% in Qinghua and 28.82%, 20.40% and 39.01% in Biyu. Si also maintained the structural integrity of leaf organelles and improved the scavenging ability of ROS by increasing the activity and relative gene expression of antioxidant enzymes. Moreover, varietal differences may play a more important role than Si.

来源： Plant Physiology and Biochemistry
发布日期:2022-02-12
全文链接:
http://agri.ckcest.cn/file1/M00/03/31/CsgkOYbbT4CAa2L9ARwAWYYyoZU132.pdf