2022年第31期总354期

蔬菜育种专题

本期导读

前沿资讯

1. The Crop Journal | 湖南农业大学揭示油菜通过调控氨基酸源-库再分配提高氮素利用效率

学术文献

1. 一项全基因组关联研究（GWAS）确定了与甘蓝型油菜抗铝性自然变异相关的多个位点

2. 生物有机肥减氮改变土壤微生物，提高不结球白菜产量和品质

3. 叶面施用GA_3促进花椰菜种子生产

4. 应用生物素G、硒和壳聚糖抵消无土栽培西兰花中镉的负效应

中国农业科学院农业信息研究所
联系人：张晓静;祁冉;顾亮亮
联系电话： 010-51503648
邮箱：agri@ckcest.cn
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前沿资讯

1. The Crop Journal | 湖南农业大学揭示油菜通过调控氨基酸源－库再分配提高氮素利用效率

简介：近日，湖南农业大学资源环境学院张振华教授课题组在The Crop Journal在线发表了题为“Increased nitrogen use efficiency via amino acid remobilization from source to sink organs in Brassica napus”的研究论文，以氮高效（H73）和氮低效（L12）基因型油菜为材料，研究了油菜整个生育期的氮素源库再分配差异。

结果表明，在油菜整个生长发育时期，H73较L12对低氮胁迫更加敏感，但成熟期H73籽粒产量和氮素利用效率更高。这主要是因为：在苗期和开花期，与L12相比，H73在低氮胁迫下有更强的氨基酸源库器官之间的转运再分配能力，老叶中CAT1、CAT4、CAT6、AAP1和APP6基因显著上调表达，大量氨基酸等有机态氮通过韧皮部汁液从老叶运输到库器官（如幼叶、花和角果），提高了分枝数和单株角果数；在角果发育期，^{15}N同位素示踪试验证实，H73较L12由角果皮向籽粒转运再分配的比例更大，有助于增加角果粒数，且这种差异由两个基因型油菜中参与有机氮转运和有机氮代谢相关基因的基因组遗传变异调控。综上所述，该研究证实了氨基酸从源向库的有效再分配有利于提高油菜产量、氮素利用效率和收获指数，为培育氮高效油菜种质和实现化肥“零增长”提供重要的理论依据和优异的基因资源。

来源：植物生物技术Pbj

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http://agri.ckcest.cn/file1/M00/10/0B/Csgk0GLiLhuAJKNDAA8ye5R1Nq4854.pdf

学术文献

1. A genome-wide association study (GWAS) identifies multiple loci linked with the natural variation for Al^{3+} resistance in Brassica napus(一项全基因组关联研究（GWAS）确定了与甘蓝型油菜抗铝性自然变异相关的多个位点)

简介：Acid soils limit yields of many important crops including canola (Brassica napus), Australia’s third largest crop. Aluminium (Al^{3+}) stress is the main cause of this limitation primarily because the toxic Al^{3+} present inhibits root growth. Breeding programmes do not target acid-soil tolerance in B. napus because genetic variation and convincing quantitative trait loci have not been reported. We conducted a genome-wide association study (GWAS) using the BnASSYST diversity panel of B. napus genotyped with 35 729 high-quality DArTseq markers. We screened 352 B. napus accessions in hydroponics with and without a toxic concentration of $AlCl_3$ (12 μM, pH 4.3) for 12 days and measured shoot biomass, root biomass, and root length. By accounting for both population structure and kinship matrices, five significant quantitative trait loci for different measures of resistance were identified using incremental Al^{3+} resistance indices. Within these quantitative trait locus regions of B. napus, 40 Arabidopsis thaliana gene orthologues were identified, including some previously linked with Al^{3+} resistance. GWAS analysis indicated that multiple genes are responsible for the natural variation in Al^{3+} resistance in B. napus. The results provide new genetic resources and markers to enhance that Al^{3+} resistance of B. napus germplasm via genomic and marker-assisted selection.

来源：Functional Plant Biology

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http://agri.ckcest.cn/file1/M00/03/39/Csgk0Yc43ZWAArX1ACprcmKjkA0332.pdf

2．Nitrogen Reduction with Bio-Organic Fertilizer Altered Soil Microorganisms, Improved Yield and Quality of Non-Heading Chinese Cabbage (Brassica campestris ssp. chinensis Makino)(生物有机肥减氮改变土壤微生物，提高不结球白菜产量和品质)

简介：Excessively using fertilizers poses serious problems such as environmental pollution, soil degeneration, and quality and yield reduction of vegetables. This study aimed to illustrate the effect of different organic manure and inorganic fertilizers on the characteristics of soil, and the growth, yield, and quality of non-heading Chinese cabbage. There were 28 treatments in the first experiment: no fertilization (CK), conventional fertilization (100% nitrogen T1), 20% reduction of total nitrogen (T2), 30% reduction of total nitrogen (T3), and 20% or 30% reduction of total nitrogen with four kinds of fertilizers and three kinds of dosages (24 treatments). Six treatments, being selected from the first experiment based on growth of plants, were further applied to the second experiment. The results of the second experiment showed that the pH, nitrate nitrogen, and organic matter content of soil treated by N2 (20% reduction of total nitrogen with 1500 kg • ha^{-1} No.1: Bacillus-enriched bio-organic fertilizer) were significantly enhanced compared with T1 (100% nitrogen). The N2-treated plants showed an 11.66% increase in root activity, 9.24% enhancement in yield, 5.79% increase in vitamin C (VC), and 47.87% decrease in nitrate content compared with T1. Nitrogen reduction with bio-organic fertilizer significantly increased the dominant phyla of Gemmatimonadetes and Chytridiomycota and significantly decreased Ascomycota, and increased the dominant genera of Gemmatimonas and Bacillus and decreased Fusarium, indicating that this treatment altered the microbial community composition of soil. Redundancy analysis (RDA) showed that AP (available phosphorus), OM (organic matter), and UREA (urease activity) of the soil were significantly correlated with microbial community structure. Yield was significantly, positively correlated with Rhodanobacter and Olpidium. In conclusion, nitrogen reduction with bio-organic fertilizer benefited growth, yield, and quality of non-heading Chinese cabbage by improving the soil quality.

来源：Agronomy

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http://agri.ckcest.cn/file1/M00/10/0B/Csgk0GLiKbyAEzDpAB9218M3bpg021.pdf

3．Foliar Application of GA_3 Stimulates Seed Production in

Cauliflower（叶面施用GA_3促进花椰菜种子生产）

简介： This study aimed to evaluate the influence of gibberellic acid on both concentration and time of application on the seed production ability of BU cauliflower-1. The experiment was conducted to determine seed production ability at five concentrations of GA_3: G_0 = Control, G_1 = 100 ppm, G_2 = 200 ppm, G_3 = 300 ppm, G_4 = 400 ppm, along with four application times at different growth stages including T_1 = Foliar application at 3 weeks after planting, T_2 = Foliar application at 4 weeks after planting, T_3 = Foliar application at 5 weeks after planting and T_4 = Foliar application at 6 weeks after planting. Results revealed that 200 ppm GA_3 gave the highest plant height (44.05 cm), the number of primary (10.88) and secondary flowering branches (31.33), stalk length (79.53 cm), seeded pods per plant (465), pod length (4.975 cm), seeds per pod (10.87), seed yield per plant (16.16 g), seed yield (0.24 ton/ha), and weight of thousand seeds (4.826 g) with the earliest curd (51.02 days) and flower initiation (84.17 days). It also gave the highest net return (Tk. 4.7 lakh/ha) and benefit-cost ratio (4.34). GA_3 application at 3 weeks after transplanting had the highest numbers of primary and secondary flowering branches, pods, seeded pods, and seed yield per plant. The treatment combination of G_2T_1 gave the earliest curd initiation (49.60 days), the highest number of secondary flowering branches (34.87), seed yield per plant (22.75 g), and seed yield (0.27 ton/h). In contrast, the G_2T_2 treatment resulted in the earliest flower initiation (81.77 days) with the highest pod length (5.20 cm), the number of pods per plant (707), and seeded pods per plant (507), and seeds per pod (11.30). Hence, 200 ppm GA3 applied three weeks after transplanting could be used as the best combination for cauliflower seed production with the highest net return and benefit-cost ratio. Enhancing seed yield is our ultimate goal; hence, we suggest 200 ppm GA_3 three weeks after transplanting for increased cauliflower seed production with the highest return and benefit-cost ratio in the study area. As we performed the study in a particular location, we recommend multilocation trials in different agro-ecological regions to study the genotype-environment interaction for final confirmation of the results.

来源： Agronomy

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http://agri.ckcest.cn/file1/M00/03/39/Csgk0Yc42y0AII4bAB061AiQgI8357.pdf

4. Application of Biocat G, Selenium, and Chitosan to Counteract the Negative Effects of Cd in Broccoli Plants Grown in Soilless Culture（应用生物素G、硒和壳聚糖抵消无土栽培西兰花中镉的负效应）

简介： The accumulation of cadmium in plants produces phytotoxic damage and a decrease in crop yield. To avoid this effect, it is necessary to prevent its absorption by roots and reduce its toxicity in plant tissues. The current study was aimed to evaluate the effect of the exogenous applications of Biocat G (fulvic/humic acids), selenium (Se), and chitosan to roots and leaves of broccoli plants exposed to Cd stress. The applied treatments were: (i) T1: Hoagland nutrient solution (NS), (ii) T2: NS + Cd at 3 mg L-1 (NS + Cd), (iii) T3: NS + Cd

+ root application of Biocat G (NS + Cd + BioG), (iv) T4: NS + Cd + foliar application of Se (NS + Cd + Se1), (v) T5: NS + Cd + root application of Se (NS + Cd + Se2), (vi) T6: NS + Cd + foliar application of chitosan (NS + Cd + chitosan1), and (vii) T7: NS + Cd + root application of chitosan (NS + Cd + chitosan2). The results showed that the exogenous application of Biocat G and Se (T3 and T5) ameliorated the adverse effects caused by Cd toxicity and significantly improved plant growth rate by decreasing Cd toxicity; besides, Biocat G was able to limit the transport of Cd from the leaves to the inflorescences, reducing the content of Cd in the edible part. These treatments (T3 and T5) yielded the best results, act on the plants by deactivating Cd toxicity, but they did not affect its accumulation in the plant tissue. In addition, Biocat G limits the transport of Cd from the non-edible to the edible part.

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