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前沿资讯

1. Designing a more productive corn able to cope with future climates(增加光合作用羧化酶可提高作物产量)

简介：植物通过光合作用来捕捉大气中的二氧化碳。这一过程的关键在于光合作用中发挥主要作用的酶Rubisco，该酶负责将二氧化碳转化为有机化合物。C4植物中的Rubisco发挥作用更快，且由于用水效率更高，C4植物更耐高温和干旱。澳大利亚国立大学和美国康奈尔大学的研究人员研发了一种转基因玉米，它能够产生更多的Rubisco，可以增强光合作用，继而促进作物生长，提高产量。研究成果发表在《Nature Plants》杂志上。

小麦、水稻等作物采用的是较为低效的C3途径，而玉米和高粱等作物则是采用更为高效的C4途径。玉米内的Rubisco最为高效，并且发挥作用所需要的氮较少。研究人员发现，通过增加玉米细胞中的Rubisco能够提高玉米产量。这一发现令人振奋，因为这表明了即便是产量较高的C4作物仍然存在增长的空间。

在这一研究中发现，不仅二氧化碳同化和作物生物质产量提高了15%，而且如果增加活跃Rubisco的量，这些数据甚至还可以变得更高。这一研究成果有望增强作物对极端生长条件的耐受度。研究人员下一步将进行田间试验以观测玉米的光合作用及产量表现。

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学术文献

1. Establishment of an efficient regeneration system using heading leaves of Chinese cabbage (Brassica rapa L.) and its application in genetic transformation(大白菜抽穗叶片高效再生体系的建立及其在遗传转化中的应用)

简介：To preserve and propagate valuable Chinese cabbage (Brassica rapa L.) using mature vegetative organs without seeds, we established a high efficiency regeneration system from heading leaf explants and further explored its application in genetic transformation. Our results showed that maximum shoot regeneration of cultivars 'Beijing New No. 3' (88.46±1.65%) and 'Chengyangqing' (73.77±1.73%) were obtained in the presence of 17.76 μM 6-benzylaminopurine (BA) and 5.37 μM α-naphthylacetic acid (NAA). The addition of silver nitrate (AgNO3) at 11.77 μM was essential for shoot regeneration from heading leaf explants. Genotypic differences in shoot regeneration frequencies (from 47.24±3.65 to 88.46±1.65%) were observed amongst eight Chinese cabbage cultivars, in addition to the number of shoots per explant (from 1.31±0.02 to 2.02±0.05) in Murashige and Skoog medium containing 17.76 μM BA, 5.37 μM NAA and 11.77 μM AgNO3. Low temperature (4 ℃) had an effect on in vitro preservation of leafy heads with a delay in leaf wilting, and

there were no significant differences in shoot induction frequency within 24 h for cultivars ‘Beijing New No. 3’ and ‘Chengyangqing’. In the genetic transformation experiments using selection with kanamycin (17.17 μM), a transformation efficiency of 0.6-1.2% was achieved, as assessed from PCR and Southern blot results. The above results suggested that the heading leaf explants can not only achieve efficient seed-independent propagation of Chinese cabbage, but also provide a feasible platform for genetic transformation.

来源： Horticulture, Environment, and Biotechnology

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http://agri.ckcest.cn/file1/M00/02/9D/CsgkOFvzdzqATyw8ABcoTwEy-KE937.pdf

2. Temporal regulation of two cytosolic phosphoglucomutases during stigma development in ornamental kale (Brassica oleracea var. acephala)(观赏羽衣甘蓝柱头发育过程中两种胞质磷酸葡萄糖苷酶的时间调控)

简 介： Phosphoglucomutases (PGM) (5.4.2.2.) belong to the Phosphohexomutases superfamily and are highly specific in catalyzing the interconversion of Glc-1-P to Glc-6-P. In this study, we characterize the expression and activity of two cytosolic PGMs (cPGM2 and cPGM3) stigmas of ornamental kale during flower development. In stigmas, cPGM expression and activity showed a gradual increase during stigma development with the highest activity around the time of anthesis. Blocking of cPGM activity in the stigmas using a known inhibitor, resulted in breakdown of self-incompatibility in immature S3 and S4 stigmas, but had no effect on the fully mature S5 stigmas. It is likely that cPGMs are required for accumulation of factors necessary for SI response in mature stigmas.

来源： Plant Signaling & Behavior

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http://agri.ckcest.cn/file1/M00/02/9D/CsgkOFvzdCKANxBnABY16EcGLfQ019.pdf

3. Identification of Rapeseed (Brassica napus) Cultivars With a High Tolerance to Boron-Deficient Conditions(甘蓝型油菜高耐缺硼品种的鉴定)

简介： Boron (B) is an essential micronutrient for seed plants. Information on B-efficiency mechanisms and B-efficient crop and model plant genotypes is very scarce. Studies evaluating the basis and consequences of B-deficiency and B-efficiency are limited by the facts that B occurs as a trace contaminant essentially everywhere, its bioavailability is difficult to control and soil-based B-deficiency growth systems allowing a high-throughput screening of plant populations have hitherto been lacking. The crop plant Brassica napus shows a very high sensitivity toward B-deficient conditions. To reduce B-deficiency-caused yield losses in a sustainable manner, the identification of B-efficient B. napus genotypes is indispensable. We developed a soil substrate-based cultivation system which is suitable to study plant growth in automated high-throughput phenotyping facilities under defined and

repeatable soil B conditions. In a comprehensive screening, using this system with soil B concentrations below 0.1 mg B (kg soil)$^{-1}$, we identified three highly B-deficiency tolerant B. napus cultivars (CR2267, CR2280, and CR2285) among a genetically diverse collection comprising 590 accessions from all over the world. The B-efficiency classification of cultivars was based on a detailed assessment of various physical and high-throughput imaging-based shoot and root growth parameters in soil substrate or in in vitro conditions, respectively. We identified cultivar-specific patterns of B-deficiency-responsive growth dynamics. Elemental analysis revealed striking differences only in B contents between contrasting genotypes when grown under B-deficient but not under standard conditions. Results indicate that B-deficiency tolerant cultivars can grow with a very limited amount of B which is clearly below previously described critical B-tissue concentration values. These results suggest a higher B utilization efficiency of CR2267, CR2280, and CR2285 which would represent a unique trait among so far identified B-efficient B. napus cultivars which are characterized by a higher B-uptake capacity. Testing various other nutrient deficiency treatments, we demonstrated that the tolerance is specific for B-deficient conditions and is not conferred by a general growth vigor at the seedling stage. The identified B-deficiency tolerant cultivars will serve as genetic and physiological “tools” to further understand the mechanisms regulating the B nutritional status in rapeseed and to develop B-efficient elite genotypes.

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4 . Biological and molecular characterization of a basal-Brassica/Raphanus Turnip mosaic virus isolate from Eruca sativa(芥菜型芜菁花叶病毒分离株的生物学和分子特性)

简介：Eruca sativa (rocket salad or arugula) and Raphanus raphanistrum (raphanus) plants with mosaic symptoms were found in the field during 2016 in São Paulo State, Brazil. Initially, the plants were submitted to indirect ELISA using a potyvirus antiserum, and then total RNA extraction and RT-PCR were performed using the ELISA-positive samples. The complete coat protein sequence was obtained and the virus was identified as Turnip mosaic virus (TuMV). Biological and Bayesian analysis grouped the TuMV rocket isolate in the Brassica-Raphanus (BR) clade that includes isolates infecting Brassica and Raphanus species. This clade has two sub-clusters, the basal-Brassica/Raphanus (basal-BR) and the Asian-Brassica/Raphanus (Asian-BR), and the rocket isolate was placed in the basal-BR cluster. TuMV from rocket was aphid-transmitted to raphanus and rocket, and saptransmitted to Chenopodium quinoa, C. amaranticolor, Nicotiana benthamiana, N. tabacum, N. glutinosa, Datura stramonium, Beta vulgaris subsp. vulgaris, Brassica rapa and to seven rocket cultivars, which were heavily affected by the virus. Cabbage and cauliflower were not infected by the virus. According to the phylogenetic analysis, at least two different introductions of TuMV isolates occurred in Brazil, corresponding to the basal-BR and world-B types, infecting Brassica/Raphanus and Brassica, respectively.

来源： Tropical Plant Pathology
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