



2017年第41期总103期

蔬菜育种专题

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2017年10月09日

➤ 前沿资讯

1. Heat-Tolerant Broccoli for the Future (研究发现西兰花的耐热基因)

简介：西兰花由于含有丰富的营养，在消费者中广泛受到欢迎。但是把这种喜凉季节的蔬菜放在餐桌上也并不容易。西兰花生产商面临许多作物进入市场的障碍因素，包括意想不到的温度波动或持续高温胁迫。如果西兰花正在开花的时候遇到高温胁迫，会降低西兰花的产量和质量，进而导致减少美国近8亿美元的市场价值。

在某一特定地点或季节发生高温胁迫的可能性是限制作物何时何地生长的主要因素。培育耐高温的花椰菜品种可以延长生长季节，扩大生产面积，增强抵御温度波动的能力，但由于缺乏对耐热性基因的了解，这方面的努力受到了限制。

美国农业部农业研究服务局（ARS）植物遗传学家Mark Farnham和他的团队在位于查尔斯顿的南卡罗来纳州美国蔬菜实验室，正在研究西兰花的耐热性基因，以填补那些研究的不足。他们已经研究开发和表述了西兰花耐热性基因的遗传来源。这些结果已经发表在Theoretical and Applied Genetics期刊上。

该研究小组评估了Farnham开发的一组西兰花植物耐受夏季高温的应激能力。他们研究鉴定了与这些植物耐热性损伤相关的遗传标记。这项工作的一个重要发现是，耐热抗性性状是由许多基因控制的复杂性状，这使得使用操控这些基因存在一些困难。然而，花椰菜育种专家对于这些标记物非常感兴趣，他们可以在研究工作中使用一些额外的工具来促进耐高温花椰菜品种的开发。

Farnham为了确定耐热性西兰花在不同胁迫环境的应激能力，他正在与科学家在东部沿海地区的高温试验田里种植耐热性的西兰花品种。一旦他们证实耐热性的西兰花在不同地点的不利条件下会有好的效果，它将被用于商业种子公司和育种专家研究使用。

耐高温西兰花有助于扩大未来的种植可能性，有助于满足人们对蔬菜营养的需求。据统计，美国花椰菜消费总量（新鲜和冷冻）从1960年代的每人1磅增长到现在的每人8到9磅。一杯西兰花可以提供超过100%的日常维生素C和K的需求，是纤维、维生素A、叶酸和钾的良好来源。

来源：ARS

发布日期：2017-09-26

全文链接：

<https://www.ars.usda.gov/news-events/news/research-news/2017/heat-tolerant-broccoli-for-the-future/>

➤ 学术文献

1. Effect of reactive oxygen species on quality maintenance of broccoli florets with electrostatic atomized water particle treatment (活性氧对静电雾化处理的西兰花采后质量的影响)

简介：The effect of electrostatic atomized water particle (EAWP) treatment on quality maintenance during postharvest storage was determined to clarify a physiological role of reactive oxygen species in broccoli florets. The EAWP treatment suppressed the floret

yellowing of broccoli during storage. The hydrogen peroxide content increased immediately after EAWP treatment but then remained at a low level during storage. Catalase (CAT) activity increased rapidly with EAWP treatment and was higher than that in the control for the first 4 days of storage. The BoCAT gene expression level with EAWP treatment also showed a high trend as compared to the control. The gene expressions of BoRboh, BoCu/ZnSOD, and BoAPX showed almost the same tendency with or without EAWP treatment. These findings suggested that hydrogen peroxide formed by EAWP treatment and regulated by CAT could be relevant to maintaining the quality of broccoli.

来源: FOOD CHEMISTRY

发布日期: 2017-06-10

全文链接:

<http://agri.ckcest.cn/ass/9519251a-0f47-4640-b8a8-8dd0d288d388.pdf>

2. Interaction of exogenous hydrogen sulphide and ethylene on senescence of green leafy vegetables (外源硫化氢与乙烯对绿叶蔬菜衰老的交互作用)

简介: Hydrogen sulphide (H₂S) gas has been found to delay the appearance of many characteristics associated with senescence of horticultural produce but little attention has been given to its physiological role or its interaction with ethylene. This study used the green leafy vegetable, pak choy (*Brassica rapa* subsp. *Chinensis*) as the principal test commodity and examined the interaction of fumigation with hydrogen sulphide and storage at 10°C in the presence of controlled levels of ethylene on endogenous ethylene production and a range of factors associated with postharvest deterioration. It was found that hydrogen sulphide inhibited ethylene production, chlorophyll loss, respiration, weight loss, various antioxidant factors and ion leakage. Hydrogen sulphide also inhibited chlorophyll loss and respiration of other green leafy vegetables/herbs, sweet Italian basil (*Ocimum basilicum*) and green curly kale (*Brassica oleracea* var. *sabellica*). The results suggest that the mode of action of hydrogen sulphide in delaying senescence could be by inhibiting both the production of ethylene and the action of ethylene. The substantial reduction in the rate of loss of chlorophyll following short-term treatment with hydrogen sulphide may have potential commercial benefit for extension in market life of green leafy vegetables.

来源: Postharvest Biology and Technology

发布日期: 2017-07-24

全文链接:

<http://agri.ckcest.cn/ass/68f7d663-d597-408e-83ad-496239279298.pdf>

3. In Vitro Bile Acid Binding Capacities of Red Leaf Lettuce and Cruciferous Vegetables (红叶生菜与十字花科蔬菜的离体胆汁酸结合能力)

简介: In the present study, we tested the bile acid binding capacity of red leaf lettuce, red cabbage, red kale, green kale, and Brussels sprouts through in vitro digestion process by simulating mouth, gastric, and intestinal digestion using six bile acids at physiological pH.

Green and red kale exhibited significantly higher (86.5 ± 2.9 and $89.7 \pm 0.9\%$, respectively) bile acid binding capacity compared to the other samples. Further, three different compositions of bile acids were tested to understand the effect on different health conditions. To predict the optimal dose for bile acid binding, we established a logistic relationship between kale dose and bile acid binding capacity. The results indicated that kale showed significantly higher bile acid binding capacity ($82.5 \pm 2.9\%$ equivalent to 72.06 mg) at 1.5 g sample and remained constant up to 2.5 g. In addition, minimally processed (microwaved 3 min or steamed 8 min) green kale showed significantly enhanced bile acid binding capacity (91.1 ± 0.3 and $90.2 \pm 0.7\%$, respectively) compared to lyophilized kale ($85.5 \pm 0.24\%$). Among the six bile acids tested, kale preferentially bound hydrophobic bile acids chenodeoxycholic acid and deoxycholic acid. Therefore, regular consumption of kale, especially minimally processed kale, can help excrete more bile acids and, thus, may lower the risk of hypercholesterolemia.

来源: Journal of Agricultural and Food Chemistry

发布日期: 2017-08-16

全文链接:

<http://agri.ckcest.cn/ass/45f67a85-3555-4688-bead-6baa9054eafa.pdf>

4. Modelling of the effect of selenium fertilization on the content of bioactive compounds in broccoli heads (施用硒肥对青花菜头中生物活性物质含量影响的模型研究)

简介: Selenium (Se) exerts many effects beneficial to health. Broccoli is a Se-hyperaccumulator plant, with Se-fertilization increasing its potential as a functional food. We studied the effect of dose, and the developmental stage at the beginning of Se-fortification, on antioxidant capacity, phenolics, glucosinolates, sulphoraphane, Se-methyl selenocysteine and myrosinase in broccoli. Se-fortification decreased the antioxidant properties and sulphur-containing compounds, but increased Se-methyl-selenocysteine content. Regression models gave $r > 0.77$ confirming that Se dose and developmental stage largely determine the behaviour of the system. Correlation models gave $r > 0.95$, allowing estimation of saturation concentration of Se-methyl-selenocysteine in broccoli cv. Traditional ($3.13 \mu\text{mol g}^{-1} \text{DM}$) and the concentration ($2 \mu\text{mol}$ sodium selenate) above which the content of phenolic compounds decreases significantly. Sulphoraphane and glucosinolates' dependence on total Se supply was consistent with myrosinase activity below 3.5-mmol sodium selenate. Our results would enable design of optimal fertilization strategies to enrich broccoli in Se with minimal impairment of antioxidants properties.

来源: Food Chemistry

发布日期: 2017-04-25

全文链接:

<http://agri.ckcest.cn/ass/dd2f67d2-c2f2-4b52-b955-d22e556ca97c.pdf>