



首页

2023年4月26 星期三 17:36:46

首页 > 科研进展 > 正文

首页

新闻动态

通知公告

科研进展

学术活动

科研平台

媒体报道

CsAlaDC and CsTSI work coordinately to determine theanine biosynthesis in tea plants (*Camellia sinensis* L.) and confer high levels of L-theanine accumulation in a non-tea plant

作者: 文章来源: 点击数: 410 更新日期: 2021-10-22

Title

CsAlaDC and CsTSI work coordinately to determine theanine biosynthesis in tea plants (*Camellia sinensis* L.) and confer high levels of L-theanine accumulation in a non-tea plant

Authors

Biyang Zhu, Jiayi Guo, Chunxia Dong, Fang Li, Siming Qiao, Shijia Lin, Tianyuan Yang, Yingling Wu, Shilai Bao, William J. Lucas, Zhaoliang Zhang *

Journal

Plant biotechnology journal

DOI

10.1111/PBI.13722

Abstract

Theanine, one of the most important components of teas, confers the umami taste and relaxation effect of tea infusion. As a non-proteinogenic amino acid, theanine solely accumulates to high levels in tea plants (*Camellia sinensis* L.); however, the underlying mechanism remains largely unknown. Theanine is biosynthesized from ethylamine and glutamate by CsTSI (Theanine Synthetase I), with ethylamine being synthesized from alanine, by alanine decarboxylase. Although CsAlaDC exhibited alanine decarboxylase activity, in vitro, the in vivo role in tea plants has not been characterized. In this study, we found ethylamine content in tea roots to be highly correlated with theanine content ($r=0.883$, $p < 0.01$), and expression levels of CsAlaDC were similarly highly correlated with the accumulation of ethylamine ($r=0.903$, $p < 0.01$) and theanine ($r=0.881$, $p < 0.01$). CsAlaDC-expressing tobacco leaves produced high levels of ethylamine, but did not produce detectable theanine. However, high levels of theanine were produced in leaves co-expressing CsAlaDC and CsTSI. These results indicate CsAlaDC and CsTSI act coordinately in determining the high level of theanine biosynthesis. This is also the first report to synthesize theanine in a non-tea plant, which offers the potential to generate relaxation-promoting foods by synthesizing theanine in crops.

