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Effects of inhibiting starch branching enzymes on molecular and crystalline structures of starches from endosperm different regions in rice

发布日期: 2019-07-27 浏览次数: 25

Food Chem. 2019 Dec 15;301:125271. doi: 10.1016/j.foodchem.2019.125271. Epub 2019 Jul 27.

Lin L, Huang J, Zhang L, Zhang C, Liu Q, Wei C

Abstract

Mature endosperm was separated regionally into different parts in three rice cultivars, Te-qing (TQ), Wu-xiang 9915 (WX9915) and Guang-ling-xiang-nuo (GLXN), and their transgenic lines with inhibition of starch branching enzyme I and IIb (SBEI/IIb-). Within the three wild-type cultivars, starches from endosperm different regions showed similar molecular and crystalline structures. However, in rices with inhibition of SBEs, amylopectin short branch-chain content and branching degree gradually decreased, but amylopectin B3+ chain content and average chain length increased gradually from the interior to exterior of endosperm. The amylose content gradually increased from the interior to exterior of endosperm in TQ- and WX9915-SBEI/II- lines. From the interior to exterior of endosperm, starch changed gradually from CC- to CB-type in TQ-SBEI/II- line and from CA- to CC-type in GLXN-SBEI/II- line, and remained CA-type in WX9915-SBEI/II- line. These results provided some information for quality breeding and utilizations of rice with inhibition of SBE.

Key words: Crystalline structure; Endosperm regional tissue; Molecular structure; Rice; Starch; Starch branching enzyme

<https://www.ncbi.nlm.nih.gov/pubmed/31376690>

