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六个不同产量玉米品种籽粒淀粉积累及相关酶活性的比较

左振朋[1],田凤龙[1,**],姜朋[1],王婧[1],马登超[2],马强[1],李栋[1],孙庆泉[1,*],董树亭[1*]

1山东农业大学农学院/作物生物学国家重点实验室 / 山东省作物生物学重点实验室，山东泰安 271018；2山东省济宁市农业科学研究院，山东济宁 272131

Comparison of Kernel Starch Accumulation and Related Enzyme Activities among Six Maize Cultivars of Different Yield Types

ZUO Zhen-Peng[1],TIAN Feng-Long[1,**],JIANG Peng[1],WANG Jing[1],MA Deng-Chao[2],MA Qiang[1],LI Dong[1],SUN Qing-Quan[1,*],DONG Shu-Ting[1*]

1Agronomy College of Shandong Agricultural University / National Key Laboratory of Crop Biology / Shandong Key Laboratory of Crop Biology, Tai'an 271018, China; 2 Jining Agricultural Science Institute, Ji'ning 272131, China

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摘要 以6个玉米品种为试材，比较研究了不同产量品种的籽粒淀粉积累和淀粉合成相关酶活性的差异。结果表明，蔗糖合酶(SS)、UDPG焦磷酸化酶(UGPase)和淀粉分支酶(SBE)是玉米淀粉合成的关键酶，较高的SS、UGPase和SBE活性利于淀粉的积累和粒重的提高。低产品种直链淀粉积累的时间(30 d)短于中产(40 d)和高产品种(50 d以上)；低产品种支链淀粉的积累在籽粒充实前期(授粉后20 d)慢于中产和高产品种，但后期差异变小；低产品种籽粒SS活性在授粉后10~30 d高于中产和高产品种，但在授粉30 d后迅速下降且降幅大于高产品种；低产品种UGPase活性峰值出现在授粉后20 d，中产和高产品种则出现在授粉后40 d，且低产品种的UGPase活性在籽粒充实后期明显低于中产和高产品种；低产品种的SBE活性在籽粒充实后期(授粉后30~50 d)明显低于中产和高产品种，而中产品种又低于高产品种，低产、中产和高产品种的SBE活性降幅分别为72.44%、44.54%和30.21%。高产和中产品种籽粒可溶性淀粉合酶(SSS)活性呈“N”形曲线变化，并于授粉后30 d出现第一个峰值，而低产品种为单峰曲线；低产品种籽粒ADPG焦磷酸化酶(ADPGPPase)活性高于中产和高产品种；在籽粒充实全期，3个产量品种淀粉脱分支酶(DBE)活性均迅速下降，不同产量品种类型间差异不显著。

关键词： 玉米 产量 籽粒 淀粉积累 酶活性

Abstract： Six maize cultivars were used to study the difference of the related enzyme activities in kernel starch accumulation and starch synthesis among different yield cultivars. Sucrose synthase(SS), UDPG pyrophosphorylase (UGPase) and starch branching enzyme(SBE) were the key enzymes in maize starch synthesis. High activities of SS, UGPase and SBE were beneficial to the accumulation of starch and the improvement of kernel weight. The time of amylose accumulation in low yield cultivars(LYV) (30 d) was shorter than that in middle yield cultivars(MYV) (40 d) and high yield cultivars(HYV) (>50 d). Amylopectin accumulation was slower in LYV than in MYV and HYV during the earlier stage of kernel-filling, but the difference among them became smaller during the later stage. SS activity in LYV kernel was higher than that in MYV and HYV during 10–30 d after pollination, but decreased rapidly at 30 days later after pollination and had larger decreasing range than that in HYV. The peak of UGPase activity appeared on the 20th day after pollination in LYV, while on the 40th day after pollination in MYV and HYV, and the activity in LYV was obviously lower than that in MYV and HYV during the later stage of kernel-filling stage. The SBE activity during the later stage of kernel-filling (30–50 d after pollination) was HYV>MYV>LYV, and the decreasing range was 72.44%(LYV), 44.54%(MYV), and 30.21%(HYV). The activity of soluble starch synthase (SSS) in MYV and HYV showed “N” type curve changes with the first peak on the 30th day after pollination, while it showed single peak curve in LYV. The activity of ADPG pyrophosphorylase (ADPGPPase) in LYV was higher than that in MYV and HYV. The activity of starch debranching enzyme (DBE) in the three yield types of cultivar all decreased rapidly during the whole process of kernel-filling, and the difference among different types was not obvious.

Keywords： Maize Yield type Kernel Starch accumulation Enzyme activities

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Corresponding Authors: 孙庆泉, E-mail: qqsun18@163.com

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