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Study on Organ-specific Starch Properties of Sweetpotato

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To study starch biosynthesis in terms of molecular structures of organ-specific starches within one plant species is interesting. The structural properties of starches from tuberous roots of various sweetpotato varieties and breeding lines, and also starches from leaf and callus of sweetpotato cv. Koganesengan were investigated in this study. Examination of the structure and pasting properties of the 16 kinds of root starches suggested that, statistically, the variation in pasting properties of the starches was more accurately reflected by amylopectin structures than by amylose. During the course of examination on starch structures of the latest breeding lines, we found two lines having root starches with unique characteristics. One had low amylose starch and the other had low temperature gelatinizing starch. The physicochemical properties of these starches were likewise characterized. In leaves where the starch structures and their diurnal-nocturnal changes were examined from leaves harvested at different times of a day. Gel-permeation chromatography of the leaf starches and amylopectins showed that, compared to root starch, the leaf starches had higher amount of materials eluted at the low molecular weight fraction which contained both amylose and a large amount of small amylopectin molecules. It was found that the amylose content of the leaf starches dropped during the daytime whereas the branch aspect of the leaf amylopectins remained relatively constant throughout the whole day. Finally, the structural properties of starch formed in the sweetpotato callus were studied. The starch content increased from nearly zero to the maximum content in the first week of culture, and then decreased afterward. Based on the chain-length distributions of the callus starches at different culture periods, it was demonstrated that the structural change from waxy to normal feature of starch granule occurred during the culture of the callus. Thus, the structural characteristics of starches from tuberous root, leaf and callus of sweetpotato have been

revealed.

Key words: starch structure, sweetpotato, tuberous root, leaf, callus

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