（学位第３号様式）

学　位　論　文　要　旨	
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題　目	Study on high-quality starch from sweetpotato cultivar “Konamizuki” and its physicochemical properties and food applications （サツマイモ品種「こなみずき」澱粉の高品質化及び物理化学特性と食品利用に関する研究）

The sweetpotato cultivar “Konamizuki” (KM) has been developed and is expected to promote starch utilization because it has unique starch that gelatinizes at approximately 20 °C lower than starches from other sweetpotato cultivars such as “Koganesengan” and “Shiroyutaka”. In this study, to produce high-quality KM starch and develop its food applications, the author evaluated (1) effect of the cultivation conditions of KM tuberous roots on starch properties and quality, (2) quality improvement of KM starch in a starch manufacturing factory, and (3) characterization of the basic physicochemical properties of KM starch and its food applications.

Effects of planting and harvesting times and periods of KM cultivation on the pasting properties and whiteness of starch as well as the polyphenol content and polyphenol oxidase activity in tuberous roots were examined. Every KM starch from each tuberous root cultivated under different conditions had a low-temperature gelatinizing property but showed a slight difference in their pasting properties. The experiments showed increased polyphenol content and polyphenol oxidase activity and consequent deterioration of starch whiteness in tuberous roots harvested in December, potentially reflecting low seasonal temperatures. Thus, KM starch quality was affected by cultivation conditions.

In a model experiment of KM starch production, the improvement of starch whiteness by pH control of mashed roots was investigated. High-whiteness KM starches were obtained from mashed roots adjusted to weak alkaline conditions (pH 7.8−9.0) by adding saturated calcium hydroxide aqueous solution. Quality improvement by pH control was also performed during KM starch production in a starch manufacturing factory. KM starch with a high whiteness value of 91.7 was successfully obtained from mashed roots at pH 8.8 without any effect on the pasting property, even if the KM roots had high polyphenol contents.

To evaluate KM starch as a food material, it was used to produce processed products (warabi-moch, tapioca pearl, and starchy noodle), and the properties were compared with those of products produced with ordinary sweetpotato and other starches. The products produced with KM starch showed higher elasticity and better texture than those produced with ordinary sweetpotato and cassava starches, indicating highly desirable properties as a food material for starchy gel products. These KM gel properties reflect distinctive structural properties, including larger quantity of amylose-like long chains of amylopectin as well as longer amyloses and longer amylose-like chains of amylopectin than of other starches. The longer chains of KM amylose and amylopectin are considered to play the role of crosslinking each molecule in the starch paste and are probably responsible for the strong gel-forming ability.

Here the author has described the high-quality and functional KM starch as a new sweetpotato starch material and revealed the excellent properties of KM starch for food applications along with its basic physicochemical properties. These results will promote KM starch utilization, which will be useful in starch and food industries in Kagoshima, thereby contributing to the regional economy. At present, some processed products that use KM starch are commercially available in the market.