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国連大学生研究成果

# Effects of heat moisture treatment on physical properties and textural quality of food products from Arenga and Sago starches

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Palm starch is important source of starch in Indonesia prepared from the pith of several genera of palm such as *Metroxylon* (spesies *Metroxylon Sago*) and *Arenga* (spesies *Arenga pinnata*). Characterization of sago starch from *Metroxylon sago* has been extensively studied, while information about arenga starch was very limited. Native starch usually has limited functional properties for certain processing such as dough development and textural quality. The physical modification such heat moisture treatment (HMT) is potential to improve the physicochemical properties of native starches. It is generally expected safer, less expensive and more ecological way than chemical modification. The objectives of research were (1) to compare some physical properties (rheological, gelling, thermal and swelling properties) of native arenga and sago starches and (2) to clarify the effects of HMT on physical properties of arenga and sago starches.

The results showed that amylose contents of arenga and sago starches were not significantly different at approximately 38%. Peak gelatinization temperature was also similar at approximately 67℃, but arenga starch showed a narrower range of gelatinization temperature than sago. The swelling power capacity of sago starch was higher than that of arenga. Arenga and sago starches at low concentrations showed shear thinning behavior, and sago formed more viscous sol than arenga. Based on frequency dependence of dynamic viscoelasticity, minimum concentration of sago starch for gel formation was 1.8% whereas that of arenga starch was 2.4%. At high concentrations, gel from arenga for gel formation starch was more rigid than that of sago. The breaking properties and texture profile of gels made from arenga and sago starches were also clearly different. Sago starch is more suitable as a thickener, while arenga starch is more suitable as gelling agent.

Optimum HMT for arenga and sago starches were determined at 120℃, 20% moisture content and heating time was 90 min and 60 min for arenga and sago starch, respectively. HMT altered all physical properties of native arenga and sago starches. HMT of starch shifted gelatinization curve to higher temperature and reduced gelatinization enthalpy. The minimum concentration for gel formation of HMT starches were increased to 4.2% and 4.5% for arenga and sago, respectively. Swelling power, pasting, rheological and textural properties of HMT starches were also significantly changed. HMT sago starch exhibited weak gel characteristics with narrow linear viscoelastic region. HMT promoted retrogradation in arenga and sago starches.

Both starches and the HMT modified samples showed different physicochemical characteristics, thus new utilization besides the traditional noodles and cakes is expected. The application of those starches for food processing is planned in the follow-up studies.