KARAKTERISISASI STRUKTUR NANO-TAPIOKA DAN APLIKASINYA DALAM BERAS ARTIFISAL
(Characterization of Nano-Tapioca Structure and its Aplication In Artificial Rice)

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ABSTRAK

Salah satu modifikasi tapioka adalah pengecilan struktur granula hingga ukuran nano. Nano-tapioka diharapkan memperbaiki karakteristik fisiko-kimia pati, salah satunya untuk memperbaiki sifat beras artifisial. Pengecilan ukuran dilakukan dengan hidrolisis enzimatis, perlakuan asam *(lintnerization)* atau secara fisik dengan penggilingan berenergi tinggi. Penelitian ini bertujuan untuk mengetahui pengaruh teknik modifikasi tapioka (perlakuan asam, enzimatis dan fisik) terhadap pengecilan struktur granula; dan pengaruh aplikasi nano-tapioka pada karakteristik fisik beras artifisial jagung. Penelitian dilakukan dua tahap: pembuatan nano-tapioka dengan tiga metode; dan uji coba tapioka modifikasi pada beras artifisial jagung. Tapioka modifikasi dianalisis dengan difraksi sinar X, ukuran partikel PSA, dan SEM. Bahan baku dan produk dianalisisis karakteristik proksimat, profil pasting, kadar pati, kadar amilosa dan tekstur. Hidrolisis dengan pengasaman menggunakan HCl 5% selama 5 jam menghasilkan granula yang umumnya masih utuh dengan ukuran relatif besar (belum mencapai nano). Walaupun demikian, terdapat granula berukuran kecil (diameter 781,8 nm). Pengecilan ukuran secara fisik menggunakan Ball Mill tiga siklus pada 1400 rpm menghasilkan partikel berukuran 871,1 nm. Perlakuan enzimatis menggunakan isoamilase selama 24 jam, menurunkan ukuran granula dengan distribusi 40,75–407,49 nm dan rata-rata 125,91 nm. Penambahan 5% tapioka modifikasi dalam beras artifisial jagung, menghasilkan butiran yang kompak, tidak lengket dan tidak mengembang (puffing) secara berlebihan.

Kata kunci: Teknologi nano, tapioka, beras artificial.

ABSTRACT

One of the modification method of tapioca is the size reduction of the starch granular to nano particle. Nano-tapioca is expected to improve physicochemical characteristics of tapioca, which is ecpeted to improve the qualities of artificial rice. Size reduction can be done by an enzymatic hydrolysis, acid treatment (lintnerization) or by physical treatment using a high-energy milling. This study aimed to determine the effect of acid, enzymatic and physical treatments against the size reduction of starch granular structure; and its effect on the physical characteristics of the artificial corn rice. The study was conducted two phases, ie the production of nano-tapioca with the above methods; and its application on artificial rice made from corn. The modified tapioca was analyzed by X-ray diffraction, particle size analyzer (PSA), and Scanning Electron Microscop (SEM). Raw materials and of artificil eith addition of size reduced tapioca was was analyzed in terms of proximate characteristics, pasting profile, starch content, amylose content and texture. Acidification applying 5% HCl for 5 hours resulted in starch granules that were generally still intact with relatively large size (not yet reached the nano size). Nevertheless, there were some small sized granules (diameter 781.8 nm). Physical size reduction using a Ball Mill three cycles at 1400 rpm produced particle size of 871.1 nm. Enzymatic treatment using isoamilase for 24 hours produced granule size distribution from 40.75 to 407.49 nm

with avarege of 125.91 nm. The addition of 5% in modified tapioca in artificial rice yielded compact, not sticky and did not puff excessively.

Keywords: Nano technology, tapioca, artificial rice.