RINGKASAN

Singkong merupakan salah satu umbi yang berpotensi sebagai alternatif diversifikasi pangan untuk mengurangi konsumsi tepung terigu. Produktivitas singkong di Indonesia sangat tinggi. Akan tetapi penggunaan singkong sebagai bahan pangan pokok maupun bahan baku olahan seringkali dibatasi oleh kandungan proteinnya serta kelemahan sifat fisik dan kimia yang menyebabkan penggunaannya pada industri pangan relatif terbatas. Salah satu upaya yang dapat dilakukan yaitu dengan melakukan modifikasi biologi dengan fermentasi menggunakan BIMO-CF dan fisik dengan siklus pemanasan-pendinginan berulang. Tujuan penelitian ini yaitu : 1) Mengkaji karakteristik fisikokimia tepung singkong termodifikasi biologi, 2) Mengkaji karakteristik fisikokimia tepung singkong termodifikasi fisik, 3) Mengkaji karakteristik fisikokimia tepung singkong termodifikasi biologi dan fisik, 4) Menentukan perlakuan terbaik tepung singkong termodifikasi biologi dan fisik.

Penelitian dilaksanakan di Laboratorium Teknologi Pertanian, Fakultas Pertanian Universitas Jenderal Soedirman dan Laboraturium Pusat Inovasi Pangan Purwokerto. Penelitian dilaksanakan selama 5 bulan dari bulan November 2019 sampai April 2020. Rancangan yang digunakan yaitu Rancangan Acak Kelompok (RAK) dengan 3 kali ulangan. Faktor penelitian terdiri 2 faktor, yaitu waktu fermentasi 24, 48, dan 72 jam dan siklus pemanasan-pendingingan berulang dengan 1 kali, 2 kali, dan 3 kali siklus. Tahap penelitian yaitu 1) persiapan alat dan bahan, 2) Pembuatan tepung singkong termodifikasi biologi dengan fermentasi BIMO-CF, 3) Pembuatan tepung singkong termodifikasi fisik dengan siklus pemanasan-pendinginan berulang, 4) Karakterisasi tepung singkong termodifikasi yang meliputi kadar air, amilosa, pati resisten, daya cerna pati, profil tekstur dan profil gelatinisasi.

Hasil penelitian menunjukkan 1) Variasi waktu fermentasi 24 hingga 72 jam secara signifikan ($p<0,05$) menyebabkan peningkatan terhadap kadar amilosa dan pati resisten, masing-masing sebesar 17,47% dan 37,87% serta penurunan kadar air dan daya cerna pati in-vitro sebesar 9,06% dan 22,05%. 2) Variasi jumlah siklus pemanasan bertekanan-pendinginan sebanyak 1 hingga 3 siklus menyebabkan peningkatan kadar amilosa, pati resisten, dan kerenyahan secara signifikan masing-masing 13,43%; 38,28%; dan 27,53% serta penurunan kadar air, daya cerna pati in-vitro, dan kekerasan sebesar 10,81%; 40,10% dan 19,04%. 3) Interaksi waktu fermentasi dengan jumlah siklus pemanasan bertekanan-pendinginan secara nyata meningkatkan kadar amilosa, pati resisten, kerenyahan, dan kohesivitas tepung singkong termodifikasi. 4) Kombinasi perlakuan terbaik berdasarkan uji indeks efektivitas adalah perlakuan fermentasi 72 jam dengan 3 siklus pemanasan bertekanan-pendinginan (T3S3). 5) Dibandingkan dengan tepung kontrol, tepung singkong termodifikasi hasil perlakuan terbaik mengalami peningkatan pada kadar amilosa, pati resisten, dan kerenyahan masing-masing sebesar 41,95 %, 262,07 %, dan 176 % serta mengalami penurunan daya cerna pati *in-vitro* sebesar 55,12 %.

Kata kunci : singkong, tepung singkong termodifikasi, fermentasi BIMO-CF, siklus pemanasan-pendinginan

SUMMARY

Cassava is one kind of tubers that has the potential as an alternative to food diversification to reduce the consumption of wheat flour. Cassava productivity in Indonesia is very high. However, the use of cassava as a staple and processed raw material is often limited by its protein content as well as the weakness of physical and chemical properties that cause its use in the food industry is relatively limited. One of the efforts that can be made is by making biological modifications by fermentation using BIMO-CF and physical fermentation with repeated heating-cooling cycles. The purpose of this study is: 1) To review the physicochemical characteristics of biologically modified cassava flour, 2) To examine the physicochemical characteristics of physically modified cassava flour, 3) To examine the physicochemical characteristics of biologically and physically modified cassava flour, 4) To determine the best treatment of biologically and physically modified cassava flour.

The research was conducted at the Laboratory of Agricultural Technology, Faculty of Agriculture Of Universitas Jenderal Sudirman and Purwokerto Center Laboratory for Food Innovation. The research was conducted for 5 months from November 2019 to April 2020. The design used is Random Group Design (RGD) with 3 replays. The research factor consists of 2 factors, namely fermentation time of 24, 48, and 72 hours and repeated heating-cooling cycle with 1 time, 2 times, and 3 times cycles. The research stage was 1) preparation of equipments and materials, 2) The manufacture of biologically modified cassava flour with BIMO-CF fermentation, 3) The manufacture of physically modified cassava flour with repeated heating-cooling cycles, 4) Characterization of modified cassava flour which includes water content, amylose, resistant starch, in-vitro starch digestibility, texture profile and gelatinization profile.

The result of the research showed 1) Variations in fermentation time of 24 to 72 hours ($p<0,05$) led to a significant increase in amylose and resistant starch levels of 17,47% and 37,87% respectively, also an decrease in water content and in-vitro starch digestibility levels of 9,06% and 22,05% respectively. 2) Variations in the number of cooling-pressurized heating cycles of 1 to 3 cycles led to a significant increase in amylose, resistant starch, and crispiness of 13,43%; 38,28%; and 27,53% respectively, also an decrease in water content and in-vitro starch digestibility and hardness levels of 10,81%; 40,10%; and 19,04% respectively. 3) The interaction of fermentation time and the number of pressurized-cooling heating cycles significantly increases the levels of amylose, resistant starch, crispiness and modified cassava flour cohesiveness. 4) The best combination of treatment based on effectiveness index test is a 72-hour fermentation treatment with 3 cycles of pressurized-cooling heating (T3S3). 5) Compared to control flour, modified cassava flour from the best treatment results an incrase in amylose, resistant starch, and crispiness levels of 41.95%, 262.07% and 176% respectively and a decrease in in-vitro starch digestibility levels of 55.12%.

Keywords : cassava, modified cassava flour, BIMO-CF fermentation, heating-cooling cycle