

DESAIN PROSES EVAPORASI NIRA KELAPA PADA PENGOLAHAN GULA CAIR DENGAN PENAMBAHAN SORBITOL DAN ANALISIS KUALITAS FISIK PRODUK SELAMA PENYIMPANAN

INTISARI

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Penelitian ini bertujuan menganalisis proses evaporasi nira kelapa dengan penambahan sorbitol, mengkaji penggunaan sorbitol sebagai penghambat terjadinya pengkristalan pada gula, dan mengkaji kondisi gula kelapa cair dengan masing-masing perlakuan selama penyimpanan. Parameter yang dicari adalah koefisien perpindahan panas (h), konstanta perubahan brix dan densitas. Tahap pertama penelitian ini digunakan variasi nira pemanenan pagi dan sore yang semuanya langsung diolah. Tahap selanjutnya sorbitol ditambahkan 1%, 2%, 3%, 4%, dan 5%. Selain itu nira diproses tanpa penambahan sebagai kontrol. Kemudian dilakukan penyimpanan gula selama satu bulan untuk mengetahui kualitas dan terbentuknya kristal gula cair. Hasil penelitian menunjukkan bahwa penggunaan nira panen pagi dan sore tidak signifikan. Sehingga hasil penambahan sorbitol 0%, 1%, 2%, 3%, 4%, dan 5% nilai koefisien perpindahan panas (h) masing-masing adalah $184.88 \pm 40.91 \text{ W/m}^2 \cdot ^\circ\text{C}$; $205.99 \pm 44.56 \text{ W/m}^2 \cdot ^\circ\text{C}$; $191.92 \pm 21.58 \text{ W/m}^2 \cdot ^\circ\text{C}$; $202.58 \pm 20.32 \text{ W/m}^2 \cdot ^\circ\text{C}$; $254.61 \pm 33.16 \text{ W/m}^2 \cdot ^\circ\text{C}$; dan $219.50 \pm 88.97 \text{ W/m}^2 \cdot ^\circ\text{C}$. Sedangkan hasil konstanta perubahan brix gula cair perlakuan penambahan sorbitol 0%, 1%, 2%, 3%, 4%, dan 5% masing-masing adalah $3.87 \times 10^{-6} \pm 5.05 \times 10^{-6}$ /menit; $2.14 \times 10^{-6} \pm 4.39 \times 10^{-6}$ /menit; $2.43 \times 10^{-6} \pm 4.68 \times 10^{-6}$ /menit; $2.68 \times 10^{-6} \pm 6.07 \times 10^{-6}$ /menit; $2.12 \times 10^{-6} \pm 5.09 \times 10^{-6}$ /menit; dan $6.03 \times 10^{-6} \pm 6.56 \times 10^{-6}$ /menit. Kemudian hasil konstanta perubahan densitas gula cair perlakuan penambahan sorbitol 0%, 1%, 2%, 3%, 4%, dan 5% masing-masing adalah $1.58 \times 10^{-6} \pm 1.54 \times 10^{-6}$ /menit; $2.46 \times 10^{-6} \pm 5.74 \times 10^{-6}$ /menit; $1.76 \times 10^{-6} \pm 2.41 \times 10^{-6}$ /menit; $1.79 \times 10^{-6} \pm 3.11 \times 10^{-6}$ /menit; $8.57 \times 10^{-6} \pm 1.89 \times 10^{-5}$ /menit; dan $2.30 \times 10^{-5} \pm 4.45 \times 10^{-5}$ /menit. Selanjutnya hasil pengamatan kristal pada 6 ulangan masing-masing penambahan sorbitol pada gula cair, pada perlakuan tanpa penambahan sorbitol ada 5 ulangan terjadi kristal. Pada penambahan sorbitol 1% ada 1 ulangan. Pada penambahan sorbitol 2% tidak terjadi kristal semua. Penambahan 3% sorbitol 2 ulangan. Penambahan sorbitol 4% teradap 1 ulangan. Pada penambahan 5% sorbitol semua ulangan tidak terjadi kristal. Hasil uji sensoris oleh petani setelah penyimpanan, aroma 72% biasa tidak asam, 24% kuat tidak asam, 4% sedikit asam. Untuk rasa 62% manis tidak asam, 32% manis sedikit pahit, dan 6% manis sedikit asam. Kemudian rasa laru yang tertinggal pada gula cair yaitu laru sedang 80% dan laru banyak 20%.

Kata kunci: Evaporasi, gula sirup kelapa, nira kelapa, pemodelan.

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DESIGN OF EVAPORATION PROCESS OF THE COCONUT SAP IN LIQUID SUGAR PROCESSING WITH SORBITOL ADDITION AND ANALYSIS OF THE PRODUCTS PHYSICAL QUALITY DURING STORAGE

ABSTRACT

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This research aims to analyze the process of evaporation of coconut sap with the addition of sorbitol, examines the use of sorbitol as an inhibitor of crystallization in sugar, and examines the condition of liquid coconut sugar with each treatment during storage. The parameters sought are heat transfer coefficient (h), brix and density change constant. The first phase of this research uses variations of the morning and evening harvest sap which are all directly processed. The next step sorbitol is added 1%, 2%, 3%, 4%, and 5%. In addition roomie processed without addition as a control. Then the sugar is stored for one month to find out the quality and formation of liquid sugar crystals. The results showed that in the process of processing liquid sugar the use of morning and evening harvest sap was not significant. So that the results of the addition of sorbitol 0%, 1%, 2%, 3%, 4%, and 5% the value of the heat transfer coefficient (h) respectively 184.88 ± 40.91 W/m².°C; 205.99 ± 44.56 W/m².°C; 191.92 ± 21.58 W/m².°C; 202.58 ± 20.32 W/m².°C; 254.61 ± 33.16 W/m².°C; dan 219.50 ± 88.97 W/m².°C;. Whereas the result of constant changes in the brix liquid sugar treatment from the addition of sorbitol 0%, 1%, 2%, 3%, 4%, and 5% respectively $3.87 \times 10^{-6} \pm 5.0 \times 10^{-6}$ /minute; $2.14 \times 10^{-6} \pm 4.39 \times 10^{-6}$ /minute; $2.43 \times 10^{-6} \pm 4.68 \times 10^{-6}$ /minute; $2.68 \times 10^{-6} \pm 6.07 \times 10^{-6}$ /minute; $2.12 \times 10^{-6} \pm 5.09 \times 10^{-6}$ /minute; and $6.03 \times 10^{-6} \pm 6.56 \times 10^{-6}$ /minute; Then the result of constant changes in the density of liquid sugar is the addition of sorbitol treatments 0%, 1%, 2%, 3%, 4%, and 5% respectively $1.58 \times 10^{-6} \pm 1.54 \times 10^{-6}$ /minute; $2.46 \times 10^{-6} \pm 5.74 \times 10^{-6}$ /minute; $1.76 \times 10^{-6} \pm 2.41 \times 10^{-6}$ /minute; $1.79 \times 10^{-6} \pm 3.11 \times 10^{-6}$ /minute; $8.57 \times 10^{-6} \pm 1.89 \times 10^{-5}$ /minute; and $2.30 \times 10^{-5} \pm 4.45 \times 10^{-5}$ /minute; Furthermore, the results of crystal observations on 6 replications of each addition of sorbitol to liquid sugar, for without the addition of sorbitol there are 5 replications of crystal. At the addition of 1% sorbitol, there is 1 replication that occurs crystalline. With the addition of sorbitol 2%, all crystals do not occur. Addition of sorbitol 3% there were 2 replications of crystals. Addition of 4% sorbitol to the first crystal repetition occurs. And the addition of the last 5% sorbitol all replication does not occur crystalline. Then the results of sensory tests on farmers obtained the results of ordinary aroma 72% not acidic, 24% strong not acidic, 4% slightly acidic. For taste 62% sweet is not sour, 32% sweet is rather bitter, and 6% sweet is rather sour. Then the laru flavor remaining in the liquid sugar is 80% regular laru and 20% much laru.

Keywords: Coconut sap, coconut sugar syrup, evaporation, modeling.

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