

## ABSTRACT

### THE EFFECT OF SUGAR ADDITION ON THE CHARACTERISTICS OF COCOA PULP KOMBUCHA (*Theobroma cacao* L.) DURING FERMENTATION

By

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This study aimed to determine the effect of sugar addition, fermentation duration, and their combination on the characteristics of cocoa pulp kombucha. The research was designed using a factorial Complete Randomized Block Design (CRBD) with two factors and three replications. The first factor was sugar addition, consisting of five levels: 5% (G<sub>1</sub>), 6.5% (G<sub>2</sub>), 8% (G<sub>3</sub>), 9.5% (G<sub>4</sub>), and 11% (G<sub>5</sub>). The second factor was fermentation duration (F), consisting of three levels: 0 days (F<sub>0</sub>), 7 days (F<sub>7</sub>), and 14 days (F<sub>14</sub>). The data obtained were tested for homogeneity using Bartlett's test, and additivity was tested using Tukey's test. The data were then analyzed using analysis of variance (ANOVA) to determine the effect of treatments. If significant effects were observed, further analysis was conducted using Orthogonal Polynomial tests at 5% and 1% significance levels. The results indicated that higher sugar addition levels (G<sub>1</sub> G<sub>2</sub> G<sub>3</sub> G<sub>4</sub> G<sub>5</sub>) led to increased values of TSS, total acid, total microbes, alcohol content, sweetness, sour aroma, color, taste, aroma, and overall acceptance. However, sour taste and aftertaste values decreased. With longer fermentation durations (F<sub>0</sub> F<sub>7</sub> F<sub>14</sub>), the values of TSS, sweetness, color, aftertaste, taste, and overall acceptance decreased, while total acid, sour taste, sour aroma, and aroma values increased. Additionally, total microbial counts increased from F<sub>0</sub> to F<sub>7</sub> but decreased from F<sub>7</sub> to F<sub>14</sub>. The best treatment combination was G<sub>5</sub>F<sub>7</sub> (11% sugar concentration and 7-day fermentation), with the following results: TSS 12.03°Brix, total acidity 0.48%, alcohol content 0.1668%, total microbes 8.69 log CFU/ml, sweetness 3.72 (sweet), color 3.88 (yellowish-brown), taste 5.28 (slightly liked), aroma 4.42 (neutral), color 4.90 (slightly liked), and overall acceptance 5.27 (slightly liked).

**Keywords:** cocoa pulp kombucha, fermentation duration, sugar addition, cocoa pulp

## ABSTRAK

### PENGARUH PENAMBAHAN GULA TERHADAP KARAKTERISTIK MINUMAN KOMBUCHA PULPA KAKAO (*Theobroma cacao* L.) SELAMA FERMENTASI

Oleh

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Penelitian ini bertujuan untuk mengetahui pengaruh penambahan gula dan lama fermentasi serta kombinasi keduanya terhadap karakteristik minuman kombucha pulpa kakao. Penelitian disusun dalam Rancangan Acak Kelompok Lengkap (RAKL) faktorial dengan 2 faktor dan 3 kali ulangan. Faktor pertama adalah penambahan gula yang terdiri dari 5 taraf yaitu 5% (G<sub>1</sub>), 6,5% (G<sub>2</sub>), 8% (G<sub>3</sub>), 9,5% (G<sub>4</sub>), 11% (G<sub>5</sub>). Faktor kedua adalah lama fermentasi (F) yang terdiri dari 3 taraf yaitu 0 hari (F<sub>0</sub>), 7hari (F<sub>7</sub>), dan 14 hari (F<sub>14</sub>). Data yang diperoleh diuji kehomogenannya dengan uji *Barlett*, kemenambahan data diuji dengan uji *Tuckey*, kemudian data dianalisis sidik ragam untuk mengetahui pengaruh perlakuan dan apabila terdapat pengaruh nyata maka data diolah lebih lanjut dengan Polynomial Orthogonal pada taraf 5% dan 1%. Semakin tinggi penambahan gula (G<sub>1</sub> G<sub>2</sub> G<sub>3</sub> G<sub>4</sub> G<sub>5</sub>), nilai TPT, total asam, total mikroba, kadar alkohol, rasa manis, aroma asam, warna, rasa, aroma, dan penerimaan keseluruhan semakin meningkat. Namun, nilai rasa asam dan *aftertaste* mengalami penurunan. Semakin lama fermentasi (F<sub>0</sub> F<sub>7</sub> F<sub>14</sub>) dilakukan, nilai TPT, rasa manis, warna, *aftertaste*, rasa, dan penerimaan keseluruhan semakin menurun. Namun, nilai total asam, rasa asam, aroma asam, dan aroma mengalami peningkatan. Selanjutnya, nilai total mikroba pada F<sub>0</sub> ke F<sub>7</sub> mengalami peningkatan, dan pada F<sub>7</sub> ke F<sub>14</sub> mengalami penurunan. Perlakuan terbaik terdapat pada kombinasi perlakuan G<sub>5</sub>F<sub>7</sub> (konsentrasi gula 11% fermentasi 7 hari) dengan nilai TPT 12,03°*Brix*; total asam 0,48%; kadar alkohol 0,1668%; total mikroba 8,69 log CFU/ml; rasa manis 3,72 (manis); warna 3,88 (kuning kecoklatan); rasa 5,28 (agak suka); aroma 4,42 (netral); warna 4,90 (agak suka); dan penerimaan keseluruhan 5,27 (agak suka).

**Kata kunci:** kombucha pulpa kakao, lama fermentasi, penambahan gula, pulpa kakao