

PENGARUH KONSENTRASI Na_2CO_3 TERHADAP KARAKTERISTIK KIMIA DAN KADAR GULA PEREDUKSI DARI BATANG DAN DAUN RUMPUT GAJAH GAMA UMAMI (*Pennisetum purpureum* cv GU)

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INTISARI

Energi baru terbarukan dapat dijadikan terobosan bagi upaya diversifikasi energi untuk mempertahankan ketersediaan energi yang berkelanjutan. Salah satu sumber energi baru terbarukan yang cukup potensial adalah biomassa lignoselulosa. Rumput gajah gama umami (*Pennisetum purpureum* cv. GU) adalah biomassa lignoselulosa hasil mutasi dari teknologi sinar gama yang ketersediaanya cukup melimpah, tidak bersaing dengan pakan dan dapat dikembangkan dalam sistem agroforestri. Objektif dari penelitian ini adalah untuk melihat sifat kimia dan kandungan gula pereduksi dengan variasi konsentrasi Na_2CO_3 pada bagian batang dan daun rumput gama umami.

Penelitian ini menggunakan bagian batang dan daun rumput gajah gama umami yang dipanen pada umur 140 hari. Bagian-bagian rumput gajah tersebut di *pretreatment* menggunakan bahan alkali Na_2CO_3 pada tiga konsentrasi yang berbeda (15%, 20% dan 25%) untuk kemudian dianalisis sifat kimianya meliputi kadar ekstraktif larut air panas, ekstraktif larut etanol-toluena, holoselulosa, alfaselulosa, hemiselulosa, Klason lignin, lignin terlarut asam, pH, dan kadar abu. Selain di analisis kimia, sampel awal dihidrolisis menggunakan enzim meiselase untuk memproduksi gula pereduksi. Sampel kemudian dianalisis kadar gula pereduksi dan laju hidrolisisnya sebagai bahan baku pembuatan bioetanol.

Hasil penelitian menunjukkan terdapat pengaruh yang signifikan dari interaksi bagian tanaman dengan konsentrasi Na_2CO_3 pada sebagian besar uji karakteristik sifat kimia rumput gajah gama umami kecuali ekstraktif larut air panas, ekstraktif etanol toluen, alfa-selulosa dan nilai pH. Sedangkan pada uji kadar gula pereduksi menunjukkan hasil yang signifikan pada keseluruhan hasil. Kadar holoselulosa (58,70%), hemiselulosa (34,47%), dan abu (15,06%) tertinggi ditunjukkan pada bagian daun rumput gama umami yang telah di *pretreatment* Na_2CO_3 20%. Kadar lignin Klason tertinggi (34,02%) didapatkan dari batang rumput gama umami yang telah di *pretreatment* Na_2CO_3 25%. Kadar lignin terlarut asam (0,12%) tertinggi ditunjukkan dari batang rumput gama umami yang telah di *pretreatment* Na_2CO_3 15%. Sedangkan, pada kadar gula pereduksi (12,34 mg/ml) tertinggi ditunjukkan oleh bagian daun dengan konsentrasi Na_2CO_3 15% dan laju hidrolisis (30,71%) ditunjukkan oleh bagian daun dengan konsentrasi Na_2CO_3 20%.

Kata Kunci: rumput gajah gama umami, konsentrasi Na_2CO_3 , sifat kimia, gula pereduksi, laju hidrolisis.

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EFFECT OF Na_2CO_3 CONCENTRATION ON CHEMICAL CHARACTERISTICS AND REDUCING SUGAR CONTENT OF THE STEMS AND LEAVES OF ELEPHANT GRASS GAMA UMAMI (*Pennisetum purpureum*

cv. GU)

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ABSTRACT

New renewable energy can be used as a breakthrough for energy diversification as effort to maintain sustainable energy availability. One potential source of new renewable energy is lignocellulose biomass. Gama umami elephant grass (*Pennisetum purpureum* cv. GU) is lignocellulose biomass resulting from mutations from gama ray technology whose availability are quite abundant, does not compete with feeds and can be developed in agroforestry systems. The objective of this study was to see the chemical properties and reducing sugar content with variations in Na_2CO_3 concentrations on the stems and leaves of gama umami grass.

This study used the stems and leaves of gama umami elephant grass harvested at the age of 140 days. The parts of elephant grass were pretreated using the alkaline material Na_2CO_3 at three different concentrations (15%, 20% and 25%) to then analyze its chemical characteristics including hot water soluble extractive, ethanol-toluene soluble extractives, holocellulose, alphacellulose, hemicellulose, clason lignin, acid dissolved lignin, pH, and ash content. In addition to chemical analysis, the initial sample was hydrolyzed using the enzyme meiselase to produce reducing sugar. The sample was then analyzed for its reducing sugar content and hydrolysis rate as raw material for making bioethanol.

The results showed that there was a significant influence of the interaction of plant parts with Na_2CO_3 concentrations in most tests of the characteristics of the chemical characteristic of elephant grass gama umami except hot water soluble extractives, ethanol toluene extractives, alpha-cellulose and pH values. Meanwhile, the reducing sugar content test showed significant results in the overall results. The highest levels of holocellulose (58.70%), hemicellulose (34.47%), and ash (15.06%) were shown on the leaves of gama umami grass that had been pretreated with 20% Na_2CO_3 . The highest Klason lignin content (34.02%) was obtained from the stems of gama umami grass that had been pretreated Na_2CO_3 25%. The highest level of acid-dissolved lignin (0.12%) was shown from the stem of gama umami grass that had been pretreated Na_2CO_3 15%. Meanwhile, the highest reducing sugar content (12.34 mg / ml) was shown by the leaves with a concentration of Na_2CO_3 15% and a hydrolysis rate (30.71%) indicated by the leaves with a concentration of Na_2CO_3 20%.

Keywords: gama umami elephant grass, Na_2CO_3 concentration, chemical characteristi, reducing sugar, hydrolysis rate.

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