

KARAKTERISTIK KIMIA DAN GULA PEREDUKSI DARI BATANG DAN DAUN RUMPUT GAJAH GAMA UMAMI (*Pennisetum purpureum* cv GU) PADA TIGA UMUR YANG BERBEDA

Afida Setianingrum¹, Denny Irawati²

INTISARI

Kebutuhan bahan bakar fosil yang tidak sebanding dengan pertumbuhan populasi manusia mendorong pemerintah untuk segera mencari terobosan baru demi memenuhi penyediaan energi nasional. Biomassa lignoselulosa dianggap sebagai bahan baku penghasil selulosa yang menjanjikan untuk produksi bioetanol. Rumput gajah gama umami (*Pennisetum purpureum* cv. GU) yang dapat dikembangkan dalam sistem agroforestri dapat dijadikan pilihan sebab komponen selulosa dalam rumput ini mempunyai potensi yang tinggi untuk menghasilkan bioetanol. Selain produktivitasnya yang tinggi, kelebihan lainnya adalah bahan ini tidak berkompetisi dengan bahan pangan nasional. Objektif dari penelitian ini adalah untuk melihat sifat kimia dan kandungan gula pereduksi dari rumput gajah gama umami pada variasi bagian tanaman dan umur panen untuk kemungkinan pengembangannya sebagai bahan baku produksi bioetanol.

Penelitian ini menggunakan bagian batang dan daun rumput gajah gama umami yang dipanen pada umur 60, 100, dan 140 hari. Bagian-bagian rumput gajah tersebut dibuat menjadi sampel serbuk dengan ukuran 40-60 mesh 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 itu, sampel akan dihidrolisis menggunakan enzim meiselase untuk memproduksi gula pereduksi. Sampel kemudian dianalisis kadar gula pereduksi melalui metode DNS dan laju hidrolisisnya.

Hasil penelitian menunjukkan terdapat pengaruh yang signifikan dari interaksi bagian tanaman dengan umur panen pada hampir semua karakteristik sifat kimia rumput gajah gama umami kecuali pada kadar ekstraktif larut air panas dan kadar abu. Kadar ekstraktif larut etanol-toluena (8,93%), holoselulosa (72,80%), hemiselulosa (39,34%) tertinggi ditunjukkan pada bagian daun rumput gajah umur 140 hari. Kadar alfaselulosa tertinggi (38,08%) didapatkan dari bagian batang rumput gajah umur 60 hari. Kadar lignin Klason tertinggi (40,20%) didapatkan dari batang rumput gajah umur 140 hari. Kadar lignin terlarut asam (0,40%) dan nilai pH (7,31) tertinggi ditunjukkan dari sampel daun umur panen 60 hari. Namun demikian, tidak ada pengaruh nyata dari interaksi bagian tanaman dengan umur panen pada kadar gula pereduksi dan laju hidrolisis enzimatis rumput gajah.

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

¹ Mahasiswa Fakultas Kehutanan Universitas Gadjah Mada

² Staf Pengajar Fakultas Kehutanan Universitas Gadjah Mada

CHEMICAL CHARACTERISTICS AND REDUCING SUGARS OF THE STEMS AND LEAVES OF ELEPHANT GRASS GAMA UMAMI (*Pennisetum purpureum* cv. GU) AT THREE DIFFERENT AGES

Afida Setianingrum¹, Denny Irawati²

ABSTRACT

The need for fossil fuels, which is not proportional to the growth of the human population, encourages the government to immediately look for new breakthroughs to meet the national energy supply. Lignocellulose biomass is considered a promising cellulose-producing raw material to produce bioethanol. Elephant grass gama umami (*Pennisetum purpureum* cv. GU) which could be developed in agroforestry systems can be used as an option because the cellulose component in this grass has a high potential to produce bioethanol. In addition to its high productivity, another advantage is that this material does not compete with national foodstuffs. The objective of this study is to look at the chemical properties and reducing sugar content of gama umami elephant grass in the variety of plant parts and harvest age for the possibility of its development as a raw material for bioethanol production.

This study used the stems and leaves of gama umami elephant grass harvested at the age of 60, 100, and 140 days. The parts of elephant grass are made into powder samples with a size of 40-60 mesh to analyze its chemical properties including hot water-soluble extractive, ethanol-toluene extractive, holocellulose, alpha cellulose, hemicellulose, Klason lignin, acid soluble lignin, pH, and ash content. In addition, the sample will be hydrolyzed using the enzyme meicelace to produce reducing sugar. The sample is then analyzed for the reducing sugar content through the DNS method and its hydrolysis rate.

The results showed that there was a significant influence of the interaction of plant parts with harvest age on almost all the chemical properties characteristic of gama umami elephant grass except for hot water-soluble extractive and ash content. The highest levels of extractive soluble ethanol-toluene (8.93%), holocellulose (72.80%), hemicellulose (39.34%) were shown in the leaf part of the elephant grass aged 140 days. The highest alphacellulose levels (38.08%) were obtained from the stem part of the 60-day-old elephant grass. The highest level of Klason lignin (40.20%) was obtained from the grass stems of elephants aged 140 days. The highest levels of acid soluble lignin (0.40%) and pH values (7.31) were shown from leaf samples of 60 days harvest age. Nevertheless, there was no noticeable influence of the interaction of plant parts with harvest age on reducing sugar content and the rate of enzymatic hydrolysis of elephant grass.

Keywords: gama umami, chemical properties, reducing sugar, hydrolysis rate.

¹ Student of Faculty of Forestry Gadjah Mada University

² Lecturer of Faculty of Forestry Gadjah Mada University