ABSTRAK

ANALISIS VEGETASI RUMPUT GAJAH TERHADAP UPAYA PENGENDALIAN EROSI PADA SALURAN DRAINASE MENGGUNAKAN METODE RAINFALL SIMULATOR

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ABSTRAK

Erosi pada saluran drainase jalan tol merupakan permasalahan serius yang mengancam stabilitas infrastruktur jalan. Ruas tol Bayung Lencir–Sebapo km. 26 tercatat mengalami erosi saluran drainase dengan laju mencapai 215 ton/ha/tahun, termasuk kategori tingkat bahaya erosi berat. Penelitian ini bertujuan untuk menganalisis pengaruh variasi intensitas hujan dan jarak tanam rumput gajah (*Pennisetum purpureum*) terhadap laju erosi, serta membandingkan efektivitasnya dengan kondisi tanpa vegetasi. Metode yang digunakan adalah eksperimental menggunakan rainfall simulator berdimensi 1 m × 1 m dengan kemiringan 25°. Variasi intensitas hujan yang diuji adalah 1, 1,5, dan 2 liter/menit, dengan jarak tanam rumput gajah 10 cm dan 25 cm, masing-masing diulang tiga kali. Laju erosi dihitung menggunakan metode USLE (*Universal Soil Loss Equation*) dan analisis statistik ANOVA. Hasil penelitian menunjukkan bahwa peningkatan intensitas hujan dari 1 menjadi 2 liter/menit meningkatkan laju erosi sebesar 92,6% pada kondisi tanpa vegetasi. Jarak tanam 10 cm terbukti lebih efektif dibandingkan 25 cm, dengan koefisien limpasan 34,5% pada intensitas rendah dibandingkan 82,5% pada jarak 25 cm dengan intensitas tinggi. Berdasarkan perhitungan USLE, total laju erosi dengan penanaman rumput gajah sebesar 6,033 kg/m²/jam, sedangkan tanpa vegetasi mencapai 21,23 kg/m²/jam. Penanaman rumput gajah mampu menurunkan laju erosi sebesar **70%** dibandingkan tanpa vegetasi, sehingga terbukti efektif sebagai solusi bioengineering yang berkelanjutan untuk pengendalian erosi tebing saluran drainase jalan tol.

Kata kunci: rumput gajah, erosi, saluran drainase, rainfall simulator, USLE, bioengineering

ABSTRACT

Vegetation Analysis of Napier Grass for Erosion Control in Drainage Channels Using the Rainfall Simulator Method

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ABSTRACT

Erosion in toll road drainage channels poses a serious threat to road infrastructure stability. The Bayung Lencir–Sebapo toll road at km. 26 recorded drainage channel erosion reaching 215 tons/ha/year, classified as a severe erosion hazard level. This study aims to analyze the effect of rainfall intensity variations and elephant grass (*Pennisetum purpureum*) planting spacing on erosion rates, and to compare its effectiveness against unvegetated conditions. An experimental method was employed using a 1 m × 1 m rainfall simulator set at a 25° slope. Rainfall intensity variations tested were 1, 1.5, and 2 liters/minute, with planting spacings of 10 cm and 25 cm, each replicated three times. Erosion rates were calculated using the Universal Soil Loss Equation (USLE) and ANOVA statistical analysis. Results indicate that increasing rainfall intensity from 1 to 2 liters/minute raised the erosion rate by 92.6% under unvegetated conditions. A 10 cm planting spacing proved significantly more effective than 25 cm, yielding a runoff coefficient of 34.5% at low intensity compared to 82.5% at 25 cm spacing under high intensity. Based on USLE calculations, the total erosion rate with elephant grass planting was 6.033 kg/m²/hour, compared to 21.23 kg/m²/hour without vegetation. Elephant grass planting reduced the erosion rate by **70%** relative to bare soil conditions, confirming its effectiveness as a sustainable bioengineering solution for erosion control on toll road drainage channel slopes.

Keywords: elephant grass, erosion, drainage channel, rainfall simulator, USLE, bioengineering