ABSTRAK
EKSTRAK BELIMBING WULUH (*Avverhoa bilimbi*) DENGAN PENAMBAHAN ECENG GONDOK (*Eichhornia crassipes*) SEBAGAI STABILISATOR KINERJA BIOBATERAI RAMAH LINGKUNGAN

(KMS. M. Ulul Azmi, 2025, 42 Halaman, 6 tabel, 10 Gambar, 4 lampiran)

Peningkatan kebutuhan energi yang berkelanjutan mendorong inovasi dalam pemanfaatan bahan hayati sebagai sumber energi alternatif. Penelitian ini bertujuan untuk mengevaluasi kinerja biobaterai berbasis ekstrak belimbing wuluh (Averrhoa bilimbi) sebagai elektrolit alami, dengan penambahan bubuk eceng gondok (Eichhornia crassipes) yang telah diaktivasi sebagai stabilisator, serta garam ionik (NaCl dan KCl) sebagai peningkat konduktivitas ionik larutan. Aktivasi bubuk eceng gondok dilakukan menggunakan larutan NaOH dengan variasi konsentrasi 0,20 M hingga 1,00 M. Evaluasi performa biobaterai dilakukan melalui pengukuran tegangan, arus listrik, intensitas cahaya, dan durasi nyala lampu LED. Hasil penelitian menunjukkan bahwa kombinasi elektrolit yang mengandung belimbing wuluh, eceng gondok teraktivasi, dan garam ionik mampu meningkatkan efisiensi penghantaran listrik secara signifikan. Kondisi optimum dicapai pada aktivasi bubuk eceng gondok dengan larutan NaOH 1,00 M dan penambahan NaCl, menghasilkan tegangan maksimum 1,551 V dan waktu nyala mencapai 18,166 jam. Sementara itu, arus tertinggi tercatat sebesar 1,93 mA pada kombinasi aktivasi yang sama dengan penambahan KCl. Meskipun belum melebihi standar tegangan baterai komersial (1,641 V), hasil ini menunjukkan potensi besar pemanfaatan bahan hayati lokal sebagai komponen penyusun biobaterai ramah lingkungan.

***Kata kunci**: Belimbing wuluh, eceng gondok, aktivasi NaOH, NaCl, KCl, tegangan, arus, biobaterai.*

ABSTRACT
BILIMBI EXTRACT (AVERRHOA BILIMBI) WITH THE ADDITION OF WATER HYACINTH (EICHHORNIA CRASSIPES) AS A STABILIZER FOR THE PERFORMANCE OF ENVIRONMENTALLY FRIENDLY BIOBATTERY

(KMS. M. Ulul Azmi, 2025, 42 Page, 6 Tables, 10 Pictures, 4 Attachment)

The increasing demand for sustainable energy encourages innovation in the use of biological materials as alternative energy sources. This study aims to evaluate the performance of a biobattery based on starfruit (Averrhoa bilimbi) extract as a natural electrolyte, with the addition of activated water hyacinth (Eichhornia crassipes) powder as a stabilizer, and ionic salts (NaCl and KCl) as an ionic conductivity enhancer. Activation of water hyacinth powder was carried out using NaOH solution with varying concentrations of 0.20 M to 1.00 M. Evaluation of biobattery performance was carried out by measuring voltage, electric current, light intensity, and LED lamp duration. The results showed that the combination of electrolytes containing starfruit, activated water hyacinth, and ionic salts was able to significantly increase the efficiency of electrical conductivity. Optimum conditions were achieved by activating water hyacinth powder with 1.00 M NaOH solution and the addition of NaCl, resulting in a maximum voltage of 1.551 V and a runtime of 18.166 hours. Meanwhile, the highest current was recorded at 1.93 mA for the same activation combination with the addition of KCl. Although this does not exceed the commercial battery voltage standard (1.641 V), this result demonstrates the significant potential of utilizing local biomaterials as components for environmentally friendly biobatteries.

***Keywords** : Starfruit, water hyacinth, NaOH activation, NaCl, KCl, voltage, current, biobattery*.