# RANCANG BANGUN ALAT PEMANGKAS PELEPAH KELAPA SAWIT (*Elaeis guineensis* Jacq.) DENGAN SUMBER TENAGA HIDROLIK

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## ABSTRAK

Penelitian ini bertujuan untuk merancang dan menguji alat pemangkas pelepah kelapa sawit (*Elaeis guineensis* Jacq.) dengan sumber tenaga hidrolik, serta menganalisis kinerja teknis, energi, dan ekonomi alat. Metode penelitian yang digunakan adalah metode eksperimen melalui tahap perancangan, pembuatan, dan pengujian alat. Hasil penelitian menunjukkan bahwa alat pemangkas pelepah kelapa sawit tenaga hidrolik berhasil dirancang dan dapat berfungsi dengan baik. Kapasitas kerja alat sebesar 352,129 pelepah/jam, sedangkan metode konvensional sebesar 964 pelepah/jam. Konsumsi energi operator menggunakan alat berkisar 0,1978–0,2837 MJ/jam, lebih rendah dibandingkan metode konvensional sebesar 1,1452–1,4948 MJ/jam. Energi motor DC yang digunakan rata-rata sebesar 111,7676 kJ. Analisis ekonomi menunjukkan biaya pokok alat sebesar Rp 148 /pelepah dengan nilai Break Even Point (BEP) sebesar 2.072 pelepah/tahun. Berdasarkan hasil penelitian, alat pemangkas pelepah kelapa sawit tenaga hidrolik mampu mengurangi beban kerja fisik operator, meskipun kapasitas kerjanya masih lebih rendah dibandingkan metode konvensional. Dengan demikian, diperlukan pengembangan lebih lanjut untuk meningkatkan kinerja alat agar dapat digunakan secara lebih optimal di lapangan.

**Kata kunci:** kelapa sawit, pemangkas pelepah, tenaga hidrolik, konsumsi energi, analisis ekonomi.

# DESIGN AND DEVELOPMENT OF AN OIL PALM FROND PRUNING TOOL (*Elaeis guineensis* Jacq.) POWERED BY A HYDRAULIC SYSTEM

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## ABSTRACT

This study aimed to design and evaluate an oil palm frond pruning tool (*Elaeis guineensis* Jacq.) powered by a hydraulic system, as well as to analyze its technical performance, energy consumption, and economic feasibility. The research employed an experimental method consisting of tool design, fabrication, and performance testing. The results showed that the hydraulic-powered oil palm frond pruning tool was successfully designed and functioned properly. The tool achieved a working capacity of 352.129 fronds/hour, while the conventional method reached 964 fronds/hour. Operator energy consumption using the tool ranged from 0.1978 to 0.2837 MJ/hour, which was lower than that of the conventional method, ranging from 1.1452 to 1.4948 MJ/hour. The average machine energy consumption was 111,7676 kJ. Economic analysis revealed that the operating cost of the tool was IDR 148 per frond, with a Break Even Point (BEP) of 2,072 fronds/year. Based on the findings, the hydraulic-powered oil palm frond pruning tool was able to reduce the operator's physical workload, although its working capacity was still lower than that of the conventional method. Therefore, further development is required to improve the tool's performance and optimize its application under field conditions.

**Key words:** oil palm, frond pruning tool, hydraulic power, energy consumption, economic analysis.