

ANALISIS DESAIN DAN KINERJA PERONTOK DAUN KELOR DENGAN PENDEKATAN TEORI KEGAGALAN

INTISARI

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Dalam proses pemanenan daun kelor, tahap perontokan merupakan tahap yang sangat krusial dan membutuhkan waktu lama. Suatu alat perontok daun kelor, *Moringa Leaf Thresher* (MLT), telah dikembangkan untuk mempercepat proses perontokan. Penelitian ini bertujuan untuk menguji desain dan kinerja MLT. Analisis material dengan pendekatan teori kegagalan (*von-mises*) digunakan untuk memprediksi beban maksimum yang dapat diterima oleh jari-jari *thresher*. Kinerja MLT diukur berdasarkan parameter efisiensi dan efektivitas. Hasil penelitian dengan mekanisme pengumpanan kontinyu untuk *feeding-rate* 1 kg dalam 6 kali pengumpanan dihasilkan efisiensi MLT sebesar 25,75%, sementara 40% tertinggal di dalam MLT, dan 34,25% tercecer di lantai. Pada mekanisme pengumpanan secara *batch* (dengan *feeding-rate* 1 kg) dihasilkan efisiensi sebesar 32% ; 34% tertinggal di dalam MLT, dan 34% tercecer di lantai. Hasil uji efektivitas didapatkan nilai sebesar 34,50 gram/menit untuk perontokan kontinyu dan 113,37 gram/menit untuk perontokan *batch*. Hasil pengamatan nilai *flavonoid* total dari perontokan daun kelor dengan MLT didapatkan nilai sebesar 2,19 %b/b dan untuk perontokan manual sebesar 2,73 %b/b. Analisis material berkaitan dengan geometri dan material dengan pendekatan teori *von-mises* tidak ditemukan kegagalan. Hasil maksimum simulasi perhitungan material menunjukkan jari-jari rotari MLT mampu menahan beban maksimum sampai 600 N atau 60 kg dengan nilai *factor of safety* 0,95 sementara pada beban 60 N diperoleh *factor of safety* 9,49.

Kata kunci: *MLT, daun kelor, von-mises, factor of safety (FS), flavonoid*

MORINGA LEAF THRESHER DESIGN AND PERFORMANCE ANALYSIS WITH FAILURE THEORY APPROACH

ABSTRACT

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In the process of harvesting Moringa leaves, the threshing stage is a very crucial stage and takes a long time. A Moringa leaf thresher (MLT) has been developed to speed up the threshing process. This study aimed to test the design and performance of MLT. Material analysis with a failure theory approach (von-mises) is used to predict the maximum load acceptable to the thresher radius. MLT performance is measured based on efficiency and effectiveness parameters. The results of research with a continuous feeding mechanism for feeding-rate of 1 kg in 6 feedings resulted in MLT efficiency of 25.75%, while 40% was left in the MLT, and 34.25% was scattered on the floor. In the batch feeding mechanism (with a feeding-rate of 1 kg) an efficiency of 32% was produced; 34% were left inside the MLT, and 34% were scattered on the floor. The effectiveness test results obtained values of 34.50 grams / minute for continuous threshing and 113.37 grams / minute for batch threshing. The results of observing the total flavonoid value of Moringa leaf threshing with MLT obtained a value of 2.19 % w / w and for manual threshing of 2.73 % w / w. Material analysis related to geometry and materials with the approach of von-mises theory found no failure. The maximum result of the material calculation simulation shows that the radius of the MLT rotary is able to withstand a maximum load of up to 600 N or 60 kg with a factor of safety value of 0.95 while at a load of 60 N a factor of safety of 9.49 is obtained.

Keywords: *MLT, daun kelor, von-mises, factor of safety (FS), flavonoid*