

ABSTRAK

RANCANG BANGUN SISTEM PENJATUHAN BIBIT SINGKONG (*Manihot esculenta* Crantz) UNTUK MENINGKATKAN EFISIENSI PENANAMAN

Oleh

RAIHAN RAMADHAN

Penanaman singkong di Indonesia masih banyak dilakukan secara manual, sehingga memerlukan tenaga kerja besar, waktu yang lebih lama, serta menghasilkan jarak dan posisi tanam yang kurang presisi. Mekanisasi penanaman menjadi solusi untuk meningkatkan efisiensi dan kualitas hasil tanam, namun alat tanam singkong yang tersedia umumnya berbiaya tinggi dan kurang terjangkau petani skala kecil. Penelitian ini bertujuan merancang dan menguji kinerja sistem penjatuhan bibit singkong semiotomatis yang sederhana, efisien, dan sesuai kebutuhan petani. Sistem dirancang menggunakan komponen mekanis berupa roda penggerak, transmisi *pulley* dan *belt*, serta *metering device* berbentuk tabung silinder dengan dua ruang penjatuhan yang digerakkan secara sinkron dengan putaran roda. Pengujian dilakukan untuk menilai akurasi jarak tanam, orientasi posisi jatuh bibit, kecepatan operasional, kapasitas kerja, dan efisiensi lapang. Hasil penelitian menunjukkan bahwa sistem mampu bekerja sesuai rancangan dengan rata-rata jarak tanam 80,79 cm, mendekati nilai desain. Uji orientasi bibit menunjukkan bahwa 92% bibit jatuh pada sudut 0° – 15° dengan rata-rata kemiringan $3,8^{\circ}$, yang sesuai dengan rekomendasi agronomis untuk mendukung pertumbuhan tunas dan akar. Kecepatan operasional alat mencapai 0,184 m/s

(0,66 km/jam), dengan kapasitas kerja teoritis 0,01657 ha/jam dan kapasitas kerja aktual 0,00929 ha/jam, menghasilkan efisiensi lapang rata-rata 56,10%. Nilai ini menunjukkan bahwa sistem penjatuhan bibit semiotomatis yang dikembangkan mampu meningkatkan efisiensi penanaman dibandingkan metode manual serta menghasilkan jarak dan posisi tanam yang lebih seragam.

Kata kunci: penanaman singkong, mekanisasi, sistem penjatuhan bibit, *metering device*.

ABSTRACT

DESIGN AND DEVELOPMENT OF A CASSAVA (*Manihot esculenta* Crantz) SEED DROPPING SYSTEM TO ENHANCE PLANTING EFFICIENCY

By

RAIHAN RAMADHAN

Cassava planting in Indonesia is still predominantly carried out manually, requiring substantial labor, longer operational time, and resulting in planting distances and orientations that are often imprecise. Mechanizing the planting process offers a potential solution to improve efficiency and planting quality; however, existing cassava planters are generally expensive and less accessible for small-scale farmers. This study aims to design and evaluate the performance of a simple and efficient semi-automatic cassava seed dropping system tailored to farmers' needs. The system was constructed using mechanical components including a drive wheel, a pulley and belt transmission, and a cylindrical metering device with two dropping chambers synchronized with the rotation of the wheel. Performance tests were conducted to assess planting distance accuracy, seed orientation upon release, operational speed, field capacity, and field efficiency. The results indicate that the system operated as designed, producing an average planting distance of 80.79 cm, closely matching the intended specification. Seed orientation tests showed that 92% of the cuttings fell within an angle of 0°–15°, with an average inclination of 3.8°, aligning with agronomic recommendations for optimal shoot and root development. The tool achieved an operational speed of

0.184 m/s (0.66 km/h), with a theoretical field capacity of 0.01657 ha/h and an actual field capacity of 0.00929 ha/h, resulting in an average field efficiency of 56.10%. These findings demonstrate that the developed semi-automatic seed dropping system can enhance planting efficiency compared with manual methods while producing more uniform planting distance and orientation.

Keywords: cassava planting, mechanization, seed dropping system, metering device.