

## **EVALUASI KINERJA OPERASIONAL TRAKTOR SEMI OTONOM DENGAN IMPLEMEN BAJAK ROTARI PADA PENGOLAHAN TANAH SAWAH**

### **INTISARI**

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Penelitian ini bertujuan untuk mengevaluasi kinerja tractor semi otonom berbasis sistem *RTK-GNSS (Real Time Kinematic – Global Navigation Satellite System) autosteering* dalam kegiatan pengolahan tanah primer menggunakan implemen bajak rotari. Parameter yang diukur mencakup kecepatan kerja aktual, lebar kerja efektif, kedalaman olah tanah, *slip* roda, deviasi lintasan, konsumsi bahan bakar, serta efisiensi waktu kerja. Seluruh pengamatan dilakukan dalam tiga ulangan untuk memperoleh nilai rata-rata yang lebih representatif dan reliabel. Hasil penelitian menunjukkan bahwa traktor semi otonom beroperasi pada kecepatan kerja aktual sebesar 1,863 km/jam, lebih rendah dari kecepatan teoritis 2,2 km/jam akibat pengaruh kondisi tanah, resistansi implemen, serta perlambatan otomatis saat manuver *headland*. Lebar kerja aktual tercatat sebesar 1,515 meter, sedangkan kedalaman pengolahan rata-rata mencapai 14,03 cm yang termasuk kategori pengolahan primer ringan. Nilai *slip* roda sebesar 4,17% mengindikasikan kinerja traksi yang optimal, sedangkan konsumsi bahan bakar mencapai 7,08 liter/jam. Salah satu temuan penting adalah deviasi lintasan rata-rata sebesar 4,08 cm, yang menunjukkan akurasi navigasi sangat baik dan jauh lebih presisi dibandingkan pengoperasian manual. Efisiensi kerja total mencapai 66,30%, dengan kehilangan waktu terbesar berasal dari manuver *Smart U-Turn* sebesar 24,36%.

**Kata Kunci:** Traktor Semi Otonom, *RTK-GNSS*, *Autosteering*, Bajak Rotari, Efisiensi, Deviasi Lintasan, Mekanisasi Pertanian.

## **OPERATIONAL PERFORMANCE EVALUATION OF SEMI-AUTONOMOUS TRACTOR WITH ROTARY PLOW IMPLEMENT IN RICE FIELD SOIL CULTIVATION**

### ***ABSTRACT***

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This study aims to evaluate the performance of a semi-autonomous tractor equipped with an RTK-GNSS (Real Time Kinematic – Global Navigation Satellite System) based autosteering system during primary tillage operations using a rotary plow implement. The measured parameters included actual working speed, effective working width, tillage depth, wheel slip, path deviation, fuel consumption, and work time efficiency. All observations were conducted in three replications to obtain more representative and reliable average values. The results showed that the semi-autonomous tractor operated at an actual working speed of 1.863 km/h, which was lower than the theoretical speed of 2.2 km/h due to soil conditions, implement resistance, and automatic deceleration during headland maneuvers. The actual working width was recorded at 1.515 meters, while the average tillage depth reached 14.03 cm, categorized as light primary tillage. A wheel slip value of 4.17% indicated optimal traction performance, while fuel consumption reached 7.08 liters per hour. One of the key findings was the average path deviation of 4.08 cm, demonstrating excellent navigation accuracy and significantly higher precision compared to manual operation. The overall work efficiency reached 66.30%, with the largest time loss originating from U-Turn maneuvers at 24.36%.

**Kata Kunci:** Semi Autonomous Tractor, RTK-GNSS, Autosteering, Rotary Plow, Efficiency, Path Deviation, Agricultural Mechanization.