THE ROLE OF GPS TECHNOLOGY IN ENHANCING SOIL PREPARATION EFFICIENCY AND SUSTAINABILITY

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Abstract

This research investigates the impact of GPS guidance on the operational efficiency of the Horsch Tiger 3 MT across a 10-hectare field, with a specific focus on fuel consumption and time management. The study reveals that GPS technology significantly enhances efficiency, reducing operational time by 23.5% (5.2 hours with GPS versus 6.8 hours without GPS) and fuel consumption by 20.8% (14.5 liters per hectare with GPS versus 18.3 liters per hectare without GPS). Moreover, GPS eliminated field overlaps entirely (0%), in contrast to an 8% overlap observed during non-GPS operations, thereby ensuring precise and uniform field coverage. These improvements translate into measurable cost savings, with a reduction in fuel expenses, alongside environmental benefits from decreased fuel usage. The findings underscore the critical role of GPS technology in optimizing agricultural operations, promoting sustainable resource utilization, enhancing productivity, and supporting the economic viability of modern farming practices. This study underscores the importance of adopting precision agriculture practices to enhance farm profitability and sustainability.

Key words: GPS, precision agriculture, soil cultivation