

Influence of Different Rhizome Sizes and Operational Speed on the Field Capacity and Efficiency of a Three-Row Turmeric Rhizome Planter

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Abstract : Influence of different turmeric rhizome sizes and machine operational speed on the field capacity and efficiency of a developed prototype tractor-drawn turmeric planter was studied. This was done with a view to ascertaining how the field capacity and field efficiency were affected by the turmeric rhizome lengths and tractor operational speed. The turmeric rhizome planter consists of trapezoidal hopper, grooved cylindrical metering devise, rectangular frame, ground wheels made of mild steel, furrow opener, chain/sprocket drive system, three linkage point seed delivery tube and press wheel. The experiment was randomized in a factorial design of three levels of rhizome lengths (30, 45 and 60 mm) and operational speeds of 8, 10, and 12 kmh⁻¹. About 3 kg cleaned turmeric rhizomes were introduced into each hopper of the planter and were planted 30 m² of experimental plot. During the field evaluation of the planter, the effective field capacity, field efficiency, missing index, multiple index and percentage rhizome bruise were evaluated. 30.08% was recorded for maximum percentage bruise on the rhizome. The mean effective field capacity ranged between 0.63 - 0.96hah⁻¹ at operational speeds of 8 and 12kmh⁻¹ respectively and 45 mm rhizome length. The result also shows that the mean efficiency was obtained to be 65.8%. The percentage rhizome bruise decreases with increase in operational speed. The highest and lowest percentage turmeric rhizome miss index of 35% were recorded for turmeric rhizome length of 30 mm at a speed of 10 kmhr⁻¹ and 8 kmhr⁻¹, respectively. The potential implications of the experimental result is to determine the optimal machine process conditions for higher field capacity and gross reduction in mechanical injury (bruise) of planted turmeric rhizomes.

Keywords : rhizome sizes, operational speed, field capacity, field efficiency, turmeric rhizome, planter

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