

PERFORMANCE EVALUATION OF NEWLY INTRODUCED MINI TEA HARVESTER

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Tea (*Camellia sinensis*) is a perennial crop, primarily harvested for its leaves, which are essential for tea production. Selective harvesting consists of the bud and top three leaves, either by hand or mechanically. The production of high-quality tea relies on this selective plucking process. Nevertheless, manual plucking is both labor-intensive and expensive, making it increasingly difficult for the industry due to rising labor shortages. In response to the tea industry's shift toward mechanical harvesting, several machines were introduced with limited success in harvesting. To address this, Brown & Company PLC developed the Browns HP512 battery-operated tea harvesting machine, though it has not been properly evaluated. This study assessed the machine's performance and cost-effectiveness by comparing its yield and economic metrics with traditional manual plucking methods. A well-maintained, high-yield tea field with red-yellow podzolic soil was selected in the Intermediate Zone, Upcountry (IU3) region of *Atampitiya*, Sri Lanka. The field features a seven-year-old plantation of the tea clone 2025, located in a region known for its extensive tea cultivation. Each harvesting method was replicated nine times. In terms of performance parameters: theoretical field capacity, actual field capacity, field efficiency, and yield performance in mechanical and manual methods were 0.0224 ha h⁻¹, 0.0194 ha h⁻¹, 86.52%, 1161.964 kg ha⁻¹ and 0.0065 ha h⁻¹, 0.0046 ha h⁻¹, 70.85%, 1032.975 kg ha⁻¹, respectively. The statistical analysis of the data indicates that the theoretical field capacity, actual field capacity, and field efficiency of the mechanical method were significantly higher than the manual method ($p \leq 0.05$). The break-even point of the machine was recorded as 5.81 ha yr⁻¹. In conclusion, due to its high performance, the machine could be recommended for small-scale to medium-scale tea estates in Sri Lanka compared with the manual plucking method.

Keywords: Tea harvester, Tea production, Yield evaluation