

DESIGNING, FABRICATING AND PERFORMANCE EVALUATION OF A SELECTIVE TEA PLUCKING MACHINE

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Tea (*Camellia sinensis*) is a perennial crop, of which, leaves are the economically most important part in tea manufacturing process. The annual tea production of Sri Lanka in 2014 was 338 million kilograms. The bud including the third leaf should be plucked either manually or mechanically and should be processed in order to obtain good quality tea. Labour-intensive manual tea plucking has become one of the major problems in the tea industry, as labour is expensive and scarce. Therefore, this study was aimed to introduce an efficient and affordable mechanical method for selective tea plucking. Main components of this machine are shoot selector, cutter, conveyer roll to direct selected leaves to the cutter, collector, battery and motor. Selecting suitable shoots for plucking by the machine itself is the most salient feature of the machine. Machine weighs 6.5 kg and the total cost of production was about 12,000 LKR. The performance of the machine (T_2) was evaluated compared to manual plucking (T_1), TRI cutting shear (T_3) and one of the Japanese non selective tea harvesters (Kawasaki) (T_4) separately, using the same operator. Actual field capacities of T_1 , T_2 , T_3 and T_4 were 0.014 ha/hr, 0.021 ha h⁻¹, 0.015 ha h⁻¹ and 0.026 ha h⁻¹, respectively whereas theoretical field capacities were 0.023 ha h⁻¹, 0.029 ha h⁻¹, 0.023 ha h⁻¹ and 0.035 ha h⁻¹, respectively. Field efficiencies recorded as 60.8%, 72%, 65.2% and 74.3%, respectively. All data were analyzed using Completely Randomized Design (CRD) with four replicates and there was a significant difference ($p < 0.05$) among the treatments. According to the consequence of Tukey's studentized method, the newly constructed selective tea harvester could be efficiently used to replace the manual harvesting, which utilizes more time and labour.

Keywords: Selective harvesting, Tea harvester, Tea production