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**Evaluating the growth and performances of young and mature tea (*Camellia sinensis*) treated with different particle size and application rate of bamboo biochar in WL1a, Sri Lanka**

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**Abstract**

Continuous cultivation of tea plants in the same soil and excessive use of agrochemicals can lead to a decline in the physical, chemical, and biological properties of the soil in tea plantations. As a solution, bamboo biochar has gained popularity among tea planters as an eco-friendly, cost-effective organic soil amendment. The main objectives of this study were to (a) Evaluate the ability of bamboo biochar for the growth performances of young and mature tea plants, (b) determine the most suitable particle size and the rate of application of bamboo biochar and (c) determine the ability of used organic activator and the concentration of the activator that can be used for charging bamboo biochar. In this study, bamboo biochar was prepared using the drum method and applied to the field using a randomized complete block design, with nine treatments based on three application rates (25g {X1}, 37.5g {X2}, and {X3}50g/plant) and three particle sizes (2mm {S1}, 4mm {S2}, and 8mm {S3}). Young plants were evaluated for increases in plant height, leaf number, primary and secondary branches, and leaf chlorophyll content, while mature plants were only assessed for changes in yield and leaf chlorophyll content. The data collected was analyzed using SAS statistical software and the best treatment combinations for each parameter were determined through mean separation using the Duncan Multiple Range test. The statistical analysis revealed that all parameters were significantly affected by the treatments. S1X1 (25g/plant with 2mm) was the best treatment for the increment of secondary branches in tea plants. Best treatment combination for the increment of the mature plant leaf chlorophyll content was S1X3 (2mm with 50g/plant). However, the limited application period was the main reason for minimum significant results for each parameter.

**Keywords:** Bamboo biochar, organic, soil amendment, Tea plant, yield

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