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Application of Fermented Spent Coffee Ground (SCG) With Inorganic Fertilizers in the Tea Fields and its Effects on the Nitrate Loading, Free Amino Acids and Cation Exchange Capacity

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Abstract

Nitrogen(N) fertilizers are accounted for the tea leave quality. Intensive N fertilizer application rates are being carried out in major tea cultivating areas to increase the tea quality. As a result, N leaching and contamination are developing as critical environmental issues. On the other hand, spent coffee grounds (SCG) is the waste/byproduct gathered after coffee consumption from factories that manufacture ready-to-drink coffee and disposed of after the brewing process. This study focuses on finding the combined effect of SCG with conventional fertilization on NO_3-N loading, cation exchange capacity, tea yield, tea quality, and other standard water quality parameters. The incorporation of fermented SCG into the tea cultivation field undoubtedly impacted the NO_3-N leaching. Two-fold SCG application showed a significant reduction in NO_3-N leaching. Two-fold SCG application to the tea field showed inhibitory/ slower nitrification rates. At the same time, one-fold application rates showed stimulatory nitrification rates. Secondly, SCG also seems to impact the water holding capacity (WHC) of soil. Two-fold application revealed significantly increased WHC, electrical conductivity (EC), and cation exchange capacity (CEC) compared to other treatments. When considering the amount of free amino acid, one indicator for tea quality, conventional fertilization, showed the least quality tea. Moreover, all the treatments with SCG incorporation showed higher amounts of free amino acids. Similarly, all the treatments incorporated with SCG showed increased tea yield except conventional only fertilization. These results suggest that the incorporation of SCG into conventional fertilization will benefit the environmental and economic terms.

Keywords: spent coffee grounds, tea, nitrate loading, tea quality

References

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