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Estimation of copper content in Sri Lankan black tea

S N Warnakulasuriya and K M S Wimalasiri*
Department of Food Science & Technology, Faculty of Agriculture, University of Peradeniya, Peradeniya 20400.

Copper is an inorganic element present in tea. The inherent copper content in tea can vary with the variation of soil characteristics in different agro-climatic elevations. The application of copper based fungicides mainly to control blister blight leaf disease may affect the copper content in tea. Fungicide application is practiced under wet and humid climatic conditions, in which the disease is more prevalent and thus the addition of copper to tea can also vary in different geographical regions. The aim of this study was to estimate the variation of copper content in black tea from different geographical regions under three main agro-climatic elevations; high grown (>1200 m, Average Mean Sea Level), mid grown (600 m-1200 m, AMSL) and low grown (<600 m, AMSL) in Sri Lanka.
The identified seven geographical regions were High/West, High/Nuwara-Eliya, High/Uva, High/Udupussellwa, Mid/West, Mid/Uva and Low, and black tea samples were collected from five selected factories in each region from four different tea grades; BOP, BOPF, Pekoe and Dust. Samples were dry-ashed at 450 ^{o}C for 12 hours, followed by an acid extraction. Each extracted sample was analyzed using ultraviolet-visible spectrophotometry at 400 nm as copper-diethyldithiocarbamate complex in carbontetrachloride and using flame Atomic Absorption Spectrophotometry (AAS) by standard addition method.

There was no significant variation of copper content in different regions ($p \leq 0.05$). A significant variation in different grades was observed from AAS method ($p \leq 0.05$). The lowest copper content (34.2 mg/kg) was reported in low grown tea, while the highest content (53.7 mg/kg) was in mid grown tea. Dust grade had the highest amount (59.7 mg/kg) of copper. There was a positive correlation (R^2=0.712) between two spectroscopic methods. As the variation of copper content in black tea from different regions was not significant, the variation in soil characters may have a very little effect on it. The variation in different grades may be due to the plucking method, possible chemical reactions during manufacture and metallic contaminants. Both spectroscopic methods can be applied to estimate the copper content in black tea. The copper content in Sri Lankan black tea lies within the limits of standards of many international bodies and therefore, can be accepted as in good export quality.

*swarna602yahoo.com Tel: 081-2395307