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Determination of the Combined Effect of Selected Parameters Affecting the Quality Retention of a Ceylon Black Tea Blend

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Abstract

The aim of this study was to determine the combined effect of the elevation level and moisture content of incoming tea, blending formula and the storage condition of the end product on the quality retention of Ceylon black tea blends instead of studying their individual effects separately. Incoming tea from 2 elevation levels (high-grown and low-grown) and moisture contents (low:7-2 and high:7+2) were selected. Tea grades, Dust-1 and BOPF were used in different ratios for blending (formula-1; 50% Dust-1, 35% BOPF and formula-2; 35% Dust-1, 50% BOPF) together with Dust (7%) and Fannings-1 (8%). Finally, the prepared blends were packed in paper-based envelopes and stored in two types of storage conditions (ambient at 26.8±1.4 °C and air-conditioned at 20.6±0.6 °C). This resulted in 16 different treatment combinations of black tea. Total color of tea subjected to different treatment combinations was determined using UV-visible spectrophotometry. Combined treatment effects on moisture content and water activity were assessed over 7.5 weeks of storage. Analysis of total color, final moisture contents, final water activities, differences in moisture contents and water activities were carried out using 4*2 factorial design, subjected to ANOVA and mean separation using Duncan's new multiple range test. They showed interaction effects ($p<0.05$) at four-factor level and significant differences ($p<0.05$) between most of the treatment combinations. Trends in moisture content and water activity were analyzed using the general linear model. Results showed that there was moisture desorption in tea subjected to certain treatment combinations while moisture absorptions in the others. Sensory analyses were conducted in two consumer-oriented ranking tests and a consumer-oriented hedonic test. The data sets were analyzed using Friedman test and Wilcoxon signed-rank test respectively. SPSS 18 software package was used for statistical analyses. Final moisture content and final water activity of tea subjected to treatment combination "high-grown, low moisture, formula-2 in air-conditioned storage" resulted in the lowest values. Analysis of the trends in the variation of moisture content and water activity showed both gradual rises and falls in the trend lines. Sensory analyses revealed the best treatment combination ($p<0.05$) which is "low-grown, low moisture, formula-1 in air-conditioned storage". According to the total color analysis the treatment combination "low-grown, low moisture, formula-2 in air-conditioned storage" resulted in the lightest infusion. Results of this study provide insights into the combined effects of factors affecting tea quality and pave a direction to promote export tea trade in Sri Lanka.

Keywords: *Blending formula, ceylon black tea blends, combined effect, quality retention, treatment combinations*

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