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Assessment of selected biochemical parameters in a hybrid population of tea to predict the quality of processed tea

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Tea is made from the processed leaves of the mature tea plant, *Camellia sinensis* L. It is one of the most popular beverages in the world. Tea breeding programs constantly attempt to improve the yield and quality of tea by producing new cultivars. Biochemical and molecular markers are frequently used to assist the conventional tea breeding techniques. Chlorophyll *a*, *b*, total chlorophyll, carotenoids and total polyphenol content in tea leaves can be used as biochemical markers to predict the quality of processed tea. In this study, young shoots of 112 individuals from a hybrid progeny which was derived from TRI 2043 and TRI 3055 through controlled hybridization in Tea Research Institute of Sri Lanka were analyzed for chlorophyll *a*, *b*, total chlorophyll and carotenoid content. 102 individuals from the hybrid population were analyzed for total polyphenol content. Acetone (80%) extraction was used for the analysis of pigments and methanol (70%) extraction was used for the analysis of total polyphenol. Spectrophotometry (absorbance at 470 nm, 646 nm, 663 nm and 765 nm for chlorophyll *a*, *b*, carotenoids and total polyphenol respectively) was used with relevant standards for quantification. Statistical analysis (Minitab16 to determine frequency distributions using histograms and boxplots, SAS 9.1 to prepare dendrogram in cluster analysis) of the results had shown wide segregation of the measured parameters and some of the off springs had recorded higher values than the parents. According to the results, highest chlorophyll *a* content were recorded in accessions 134, 16 and 67 (3.25 mg/g, 3.10 mg/g and 2.92 mg/g respectively) and chlorophyll *b* in accessions 134, 16 and 67 were also higher than the others in the population (1.21 mg/g, 1.13 mg/g and 1.02 mg/g respectively). The total chlorophyll content in accessions 134, 16 and 67 were recorded as 4.46 mg/g, 4.23 mg/g and 3.95 mg/g respectively. Carotenoid content in accessions 77, 98 and 36 were higher than the others in the population (2.46 mg/g, 1.63 mg/g and 1.10 mg/g respectively). The highest total polyphenol content (33.13%) was recorded in parent TRI 3055. Total polyphenol contents in accessions 94, 72, 95, 92 and 102 were higher than the rest of the progeny (32.51%, 31.33%, 31.10%, 30.87% and 30.28%). Measured parameters of the hybrid population were subjected to cluster analysis. The resultant dendrogram clearly categorized the progeny into four clusters. Accessions with higher chlorophyll, carotenoid and polyphenol contents (accessions 150, 52, 35, 134 and 16) could be candidates for the development of new cultivars with better quality tea.

Keywords: Chlorophyll, Carotenoid, Polyphenol, Tea, Cultivar