

Seasonal Variation of Total Antioxidant Contents of Wild Bush Tea

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Abstract

The objective of this study was to determine the seasonal variation on the total antioxidant contents of wild bush tea leaves. At harvest, leaves were freeze dried and ground for total antioxidants using the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) method. The results of this study demonstrated that the total antioxidants contents were lowest during autumn (66%) and spring (67%) whereas the highest were during winter and summer (99%). Thus, suggesting winter and summer as best time to maximize the potent antioxidant contents of wild bush tea leaves.

INTRODUCTION

The wild bush tea leaves contain 5-hydroxy-6,7,8,3',4',5'-hexamethoxyflavon-3-ol, compound identified as the major flavonol compound in bush tea (Mashimbye et al., 2006). Traditionally, bush tea is used for cleansing or purifying blood, treating boils (carbuncles), bad acne, infected wounds and cuts, and bathing and as lotion on skin eruptions (Roberts, 1990). The plant is also used for coughs and sores and as a gargle for throat infections as an aphrodisiac (Mabogo, 1990). Bush tea leaves have no caffeine contents or pyrrolizidine alkaloids (McGaw et al. 2007), thus supporting the development of bush tea as a healthy beverage alternative to caffeine containing tea (Mudau et al., 2007a). Agronomic practices such as mineral nutrition have been reported to increased growth and total polyphenols of bush tea under a controlled environment (Mudau et al., 2006, 2007b), although excessive application showed to have an adverse effect on tea quality (Mogotlane et al., 2007; Mudau et al., 2007b, 2007c).

Whether seasonal variation would improve the total antioxidant contents of bush tea is unknown. However, it is established that bush tea harvested from wild have the highest concentrations of condensed tannins were during autumn (4.82%) compared with winter (2.44%), spring (2.66%) and summer (3.04%) (Mudau et al., 2007d). The hydrolysable tannins were lowest during summer (0.01%) compared with autumn and winter (0.14%) and spring (0.13%) (Mudau et al., 2007d). The authors also reported that polyphenols of wild bush tea leaves were lowest in March and April (autumn) and September (mid-spring) and highest in June and July (mid-winter) and summer. Therefore, the objective of this study was to determine seasonal variation of total antioxidants in wild bush tea leaves harvested from the wild in an attempt to develop the best time to harvest wild bush tea. The results of the study will be used in future to compare the extent in which different cultural practise and processing techniques could affect quality in cultivated bush tea.

MATERIALS AND METHODS

Study Site

The bush tea leaves were collected from Muhuyu Village (24°N 50'E, 31°S 17'E, alt 610m; subtropical type climate, i.e. summer rainfall, cold and dry winter). Two hundred (200) of leaf (matured laves i.e. 40-80 leaves from the from the shoot tips) in 20 plants of bush tea were randomly collected from the end of each month i.e. January to

December 2003. The leaves with the average moisture content of 42% were air dried in the shade. The annual average rainfall is 650 mm per annum with temperature ranging from 13-18°C in winter and 27-39°C in summer (Limpopo Province, South Africa). The season varies as follows (i.e. autumn (March-May, winter (June-August), spring (September to November) and summer (December to February). The soil type is sandy loam with pH ranging from 5.6-7.4. The meteorological data were supplied by Provincial Department of Agriculture, Vhembe District, Limpopo Province, South Africa.

Antioxidants Extraction and Total Antioxidant Analysis

Preparation of leaf extracts for total antioxidants and determination of antioxidant assays were determined by the method described by (Mogotlane et al., 2007).

Statistical Analysis

Analysis of variance was done on data using the GLM (General linear model) procedure of SAS version 8.0 (SAS Institute Inc., 1999).

RESULTS AND DISCUSSION

Results in Table 1 showed that there was significant differential seasonal variation of total antioxidants content in wild bush tea. The highest total antioxidants content were during winter and summer (99%) whereas the lowest were during autumn (66%) and spring (67%). The differences between the lowest and the highest total antioxidants were 32%. Similar differential responses were also reported by Mudau et al. (2006), who reported that concentration of total polyphenols in leaves of wild bush tea were lowest in March, April (mid autumn) and September (mid-spring) and highest in June and July (mid-winter). Similarly, Mudau et al. (2007) also confirm that the climatic conditions were varies with time of the year, with low temperature (24 °C), rainfall (19.5mm) and relative humidity (44%) during winter followed by gradual temperature increase during spring and summer (39.8 °C) and relative humidity (88%). In conclusion, the results of this study revealed that the total antioxidants contents were lowest during autumn (66%) and spring (67%) whereas the highest total antioxidants content were during winter and summer (99%). Thus, suggesting winter and summer as best time to maximize the potent total antioxidant contents of wild bush tea leaves.

ACKNOWLEDGEMENTS

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Figures

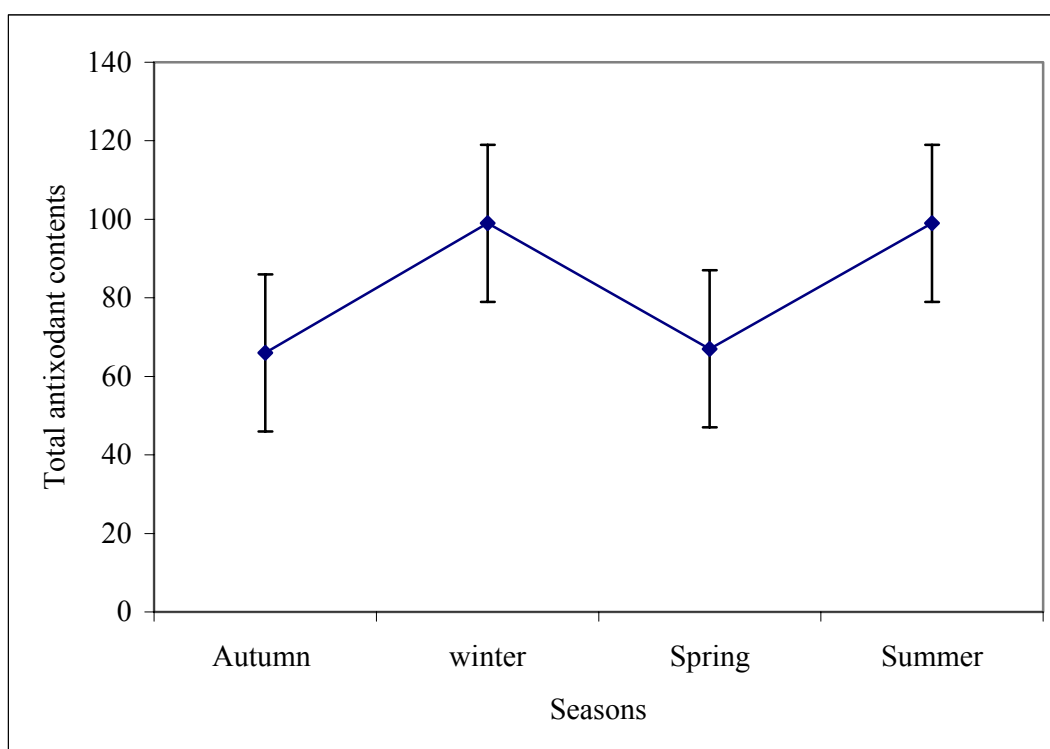


Fig. 1. Response of percentage contents of seasonal total antioxidants contents with error bars of bush tea during 2003 season.

