The Impact of Storage Time and Seasonal Harvesting on Levels of Sutherlandins and Sutherlandiosides in *Lessertia frutescens*

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INTRODUCTION

In South Africa, an estimate of 70% of the population frequently uses traditional medicine for their health care needs. The use of *Lessertia frutescens* (Figure 1,2) by various cultural groups dates back to the earlier civilizations and continues to be used today to treat a multitude of ailments. Even in Western countries, *L frutescens* is used by many people for its anti-proliferative or anti-inflammatory activities. In establishing quality, safety and efficacy of traditional medicine, one would need to ensure that the crude material is of optimal quality.

Figure 1: *Lessertia frutescens* showing the leaves, flowers and pods (Van Wyk, 2008).

Figure 2: *Lessertia frutescens* whole plant (Van Wyk and Albrecht, 2008).

Table 1: Concentrations of flavonoids and triterpenoids (mg/ml) calculated according to the peak area (mAU) after HPLC analysis of season, storage and stem samples of *L. frutescens* for the constituents, sutherlandin A, sutherlandin D, sutherlandioside B and sutherlandioside D.

Season, storage, twigs/stem	Sutherlandin A (*n* = 12) (mg/ml) (%)	Sutherlandin D (*n* = 12) (mg/ml) (%)	Sutherlandioside B (*n* = 12) (mg/ml) (%)	Sutherlandioside D (*n* = 12) (mg/ml) (%)
Summer	3.67±0.01 (22.1)	4.10±0.01 (24.7)	3.01±0.03 (18.1)	5.82±0.04 (35.1)
Autumn	4.75±0.04 (28.6)	6.37±0.03 (38.4)	2.15±0.03 (12.9)	3.33±0.03 (20.1)
Winter	4.23±0.01 (25.5)	5.25±0.01 (31.6)	2.89±0.02 (17.4)	4.23±0.02 (25.5)
Spring	6.56±0.02 (39.5)	6.08±0.02 (36.6)	1.47±0.01 (8.9)	2.50±0.02 (15.0)
Storage	4.07±0.05 (25.7)	4.25±0.02 (26.9)	2.82±0.11 (17.8)	4.66±0.03 (29.5)
Twigs / stem	4.67±0.08 (26.8)	3.31±0.06 (19.0)	3.62±0.01 (20.8)	5.80±0.14 (33.3)

MATERIALS & METHODS

Leaves, stems and twigs of *L. frutescens* were harvested on a farm near Stellenbosch, South Africa, in spring, summer, autumn and winter. Samples were extracted with 45% ethanol and subsequently freeze-dried. A leaf sample was divided into 2, of which the one was processed immediately and the other stored for 1 year. Flavonoid and triterpenoid content was analyzed using HPLC.

RESULTS

Concentrations of flavonoids (Figure 3) and triterpenoids (Figure 4) showed significant (P<0.0001) seasonal changes. Highest concentrations of sutherlandin A were recorded in spring (39.5%), sutherlandin D (38.4%) in autumn, and of sutherlandioside B (18.1%) and D (35.1%) in summer (Table 1). Storage of the leaves resulted in a significant (P<0.0001) increases in sutherlandin levels (Figure 5), while sutherlandioside levels decreased (Figure 6). Significant differences in the flavonoid (Figure 5) and triterpenoid concentrations (Figure 6) were also recorded between leaves and stems.

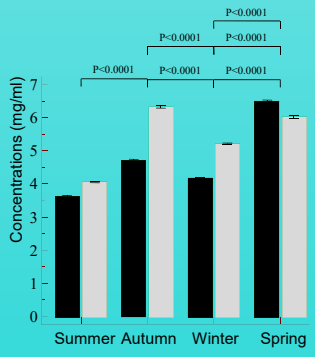

Figure 3: Concentrations of sutherlandin A (black bars) and D (grey bars) in leaf material of summer, autumn, winter and spring.

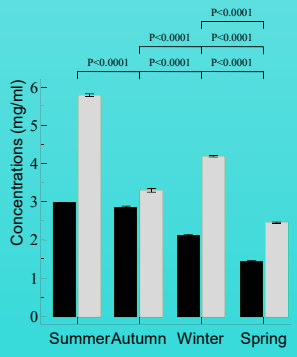

Figure 4: Concentrations of sutherlandioside B (black bars) and D (grey bars) in leaf material of summer, autumn, winter and spring.

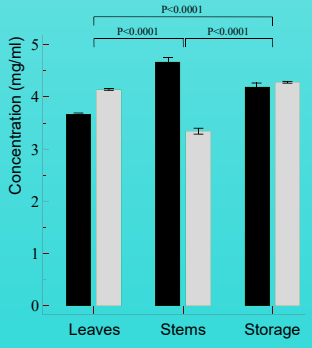

Figure 5: Concentrations of sutherlandin A (black bars) and D (grey bars) in leaves and stems harvested in summer.

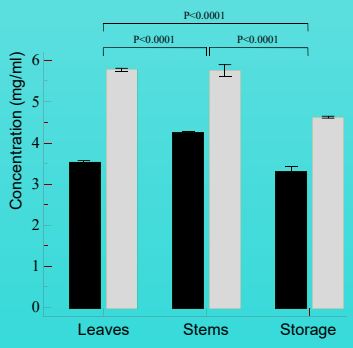

Figure 6: Concentrations of sutherlandioside B (black bars) and D (grey bars) in leaves and stems harvested in summer.

CONCLUSIONS

Consumers, manufacturers, growers, researchers, amongst others, are able to benefit from the many opportunities resulting from the acquiring of new knowledge and understanding of the diverse plant world. This requires the input of correct identification, quality assurance, standardization and quality control, in order to contribute towards safety and efficacy.

In this study, results demonstrate that the production of secondary metabolites, are influenced by both seasonal harvesting and storage. These changes in constituent levels are of clinical, pharmacological and economic importance.

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