

POSTER SUMMARY

**SEPARATION, IDENTIFICATION AND CHARACTERISATION
OF EXTRACTIVES FROM SUGARCANE
(*SACHARRUM OFFICINARUM*) LEAF**WALFORD S¹, EGLI S^{1,2} and MARTINCIGH B²¹*Sugar Milling Research Institute, University of KwaZulu-Natal, Howard College Campus, Durban, 4041, South Africa*²*School of Chemistry, University of KwaZulu-Natal, swalford@smri.org segli@smri.org martinci@ukzn.ac.za***Abstract**

The separation, identification and characterisation of the extractives from green and brown leaves of sugarcane plant (*Sacharrum officinarum*) are described. Green leaves were extracted by boiling in water, sonicating in a 1:1(v/v) methanol:water solution and 1:1(v/v) acetone:water solution and by the soxhlet technique. Dried leaves were extracted by sonication in a 1:1(v/v) methanol:water solution. Flavonoids and phenolic compounds in the green and dried leaf extracts were analysed, identified and characterised by use of Ultraviolet spectrophotometry and High Pressure Liquid Chromatography with photodiode array detection. The efficiency of the extraction methods were compared to previously reported values. The soxhlet technique gave the highest extraction of flavonoids and phenolic compounds.

Keywords: sugarcane extractives, green leaves, dried leaves, analysis, chemical characterisation

Introduction

Flavonoids are phenolic compounds shown to exhibit potential antioxidant, anticancer and cardioprotectant characteristics (Duthie and Crozier, 2000; Colombo *et al.*, 2005; Harris *et al.*, 2007). Recent research in Brazil has indicated that sugarcane leaves are a potential source of flavonoids (Colombo *et al.*, 2005; 2008). This poster summarises the separation, identification and characterisation of flavonoids from the green leaves and dry trash from South African sugarcane.

Methods

Crushed green leaves were extracted by using the following techniques - boiling in water, sonication in a 1:1(v/v) methanol: water solution, sonication in a 1:1(v/v) acetone: water solution and traditional soxhlet extraction. Trash was extracted by sonication using a 1:1(v/v) methanol: water solution

Extracts were analysed by high pressure liquid chromatography (HPLC) on a reversed phase column using a photo-diode array detector (HP1100 system using a water-acetonitrile gradient). Recoveries were measured by adding naringin (a flavonoid known to be absent in sugarcane extracts) to the samples before extraction.

Possible antioxidant properties were measured by determining the total phenolic compounds present in the extract using Folin Ciocalteu reagent and expressing the concentration in terms of mg gallic acid equivalents (GAE)/g solid extract.

Results

Extraction yields

The extraction yields and total flavonoid concentration obtained are shown in Table 1. Whilst the trash sample contained flavonoids, they could not be isolated from the background extractants.

Table 1. Extraction yields and flavonoid concentration in the extracts from different extraction techniques.

Green leaves	Yield (%)	Flavonoid extract (mg/g extract)
Boiling water	10.7	3.4
sonication in a 1:1(v/v) methanol: water solution	12.7	11.0
sonication in a 1:1(v/v) acetone: water solution	12.8	10.7
soxhlet extraction	<i>Not measured</i>	16.3
Trash		
1:1(v/v) methanol: water solution	2.4	2.5

Flavonoid identification

Flavonoids were identified by retention time (HPLC analysis) and UV spectra compared with known standards analysed under identical conditions. A number of flavonoids were identified in the extracts from the green leaves (shown in Figure 1 with their structure).

Antioxidant properties

A measure of possible antioxidant properties was determined by measuring the total phenols present in the extract (results are shown in Table 2).

Table 2. Antioxidant properties of extracts measured as Gallic Acid equivalents (mg/g of extract).

Green leaves	GAE (mg/g extract)
Boiling water	9.2
sonication in a 1:1(v/v) methanol: water solution	8.9
sonication in a 1:1(v/v) acetone: water solution	11.6
soxhlet extraction	37.7
Trash	
1:1(v/v) methanol: water solution	2.7

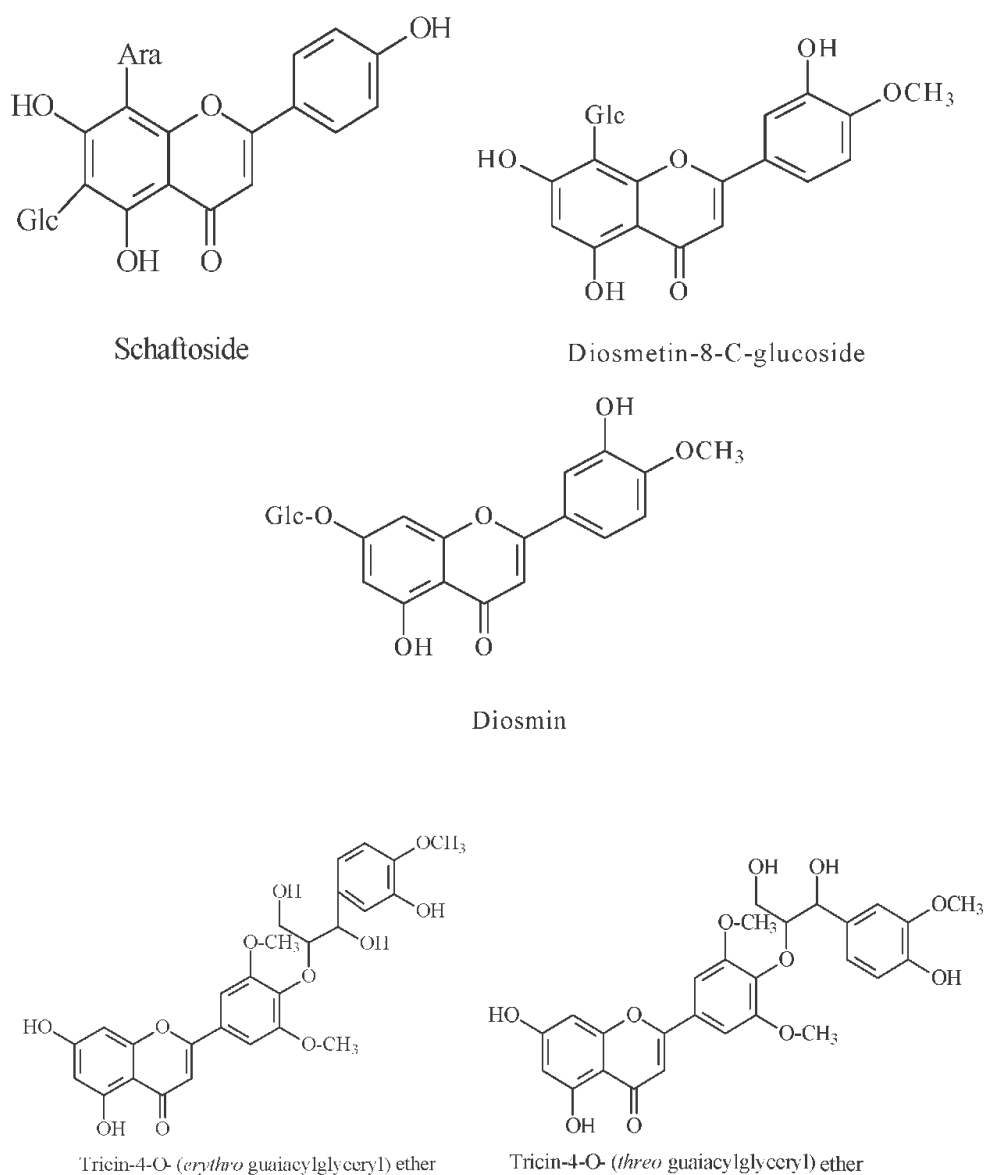


Figure 1. Structures of the five flavonoids isolated from green leaves.

Conclusion

Sonication and soxhlet extraction were shown to be useful techniques to prepare extracts from green sugarcane leaves containing phenolic compounds. Five flavonoids were identified in the extracts that could have antioxidant properties.

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