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STUDIES ON TANNIN EXTRACT, FROM CAESALPINIA CORIARIA AND ANACARDIUM OCCIDENTALIS, USING DIFFERENT EXTRACTION TECHNIQUES AND SPECTROPHOTOMETRIC QUANTIFICATION

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ABSTRACT

Tannins are a large class of complex phenolic compounds, comprising hydrolysable, condensed and complex. Extracts of Caesalpinia coriaria and Anacardium occidentalis was analysed by quantitative spectrophotometric method. Three extraction methods were used in this study and results were compared respectfully, under reflux extraction, microwave extraction and ultra sonication. From this study it can be observed that, for all investigated plants, Anacardium occidentalis has highest concentration of tannins and that microwave extraction is the best choice for extraction technique.

KEYWORDS: Caesalpinia coriaria, Anacardium occidentalis, tannins, spectrophotometric analysis, under reflux extraction, microwave extraction and sonication.

INTRODUCTION

Tannins are naturally occurring plant polyphenols and are widely distributed in the plant kingdom. Their main characteristic is that they bind and precipitate protein (Ciulei *et.al.* 1993). Tannins are high molecular weight polyphenolic compounds that exist in a variety of plant species. Tannase (tannin acyl hydrolase, E C 3.1.1.20) is the enzyme responsible for the decomposition of hydrolysable tannins, especially gallotannins, to glucose and gallic acid (Ibuchi *et.al.* 1972). Conventional extraction methods such as heating, boiling or refluxing can be made use for extraction of natural products; the disadvantages are the loss of

substances of interest due to hydrolysis, oxidation and ionization during the extractive process. In recent years, some new extraction methods have been employed for the extraction of natural products from herbals, including ultrasoundassisted extraction (Zhang *et.al.* 2011) microwave-assisted extraction (Hayat *et.al.* 2009) supercritical fluid extraction (Oliveira *et.al.* 2009) and accelerate solvent extraction (Wang and Lan. 2011). The present study aimed to evaluate the quality extraction method for extraction of tannins from plant materials.

Experiment

Plant material: Anacardium occidentalis plant seed testa and *Caesalpinia coriaria* dried plant material was used for extraction of tannins by using distilled water.

Extraction under reflux: 1 gm of plant material was extracted under reflux with 150 ml of distilled water for 30 min.

Microwaves: 1 gm of plant material was microwave extracted (power 9X, regime 80%) for three cycles of 1min with 50 mL distilled water (Namiesnik and Georecki. 2000)

Sonication: following method were used for ultra sonication.

By using ultrasonic probe (20kHz) in a glass vessel with provisions to set required output power and time the Ultrasonic extraction experiments were performed.

a) 1gm plant material was extracted under sonication with 50 mL distilled water for 90 min. in an ultrasonic bath.

b) In the ultrasonic bath 1gm plant material was extracted under sonication with 50 ml hot distilled water for thirty minutes.

c) 1 gm plant material was extracted under sonication with 10 ml methanol and 50 ml distilled water for thirty minutes in an ultrasonic bath.

By using Whatman filter paper no. 1 all extracted were filtered into a clean conical flask.

Spectrophotometric analysis

The amount of phenolics in extracts was estimated by the Folin- Ciocalteau method (Quantification of Tannins in Tree Foliage. 2000., Lokeswari and Lenin Kumar. 2012). 150 mL aliquots of the diluted extracts was mixed with Folin- Ciocalteau (sigma - aldrich) reagent and 20 % (w/v) Na_2CO_3 solution were added. In the boiling water the test tubes were placed for one minute and cool the test tubes under running tap water. At 650 nm the absorbance of the resulting solution was measured with a spectrophotometer.

RESULTS AND DISCUSSIONS

Tannins are considered to be the plants secondary metabolic products. After lignin, tannins are the second most abundant group of plant phenolics. The obtained results shows that the aqueous phenolic extracts of *Caesalpinia coriaria* and *Anacardium occidentalis* are tannin rich plant resources, *Anacardium occidentalis* has highest tannin rich plant compare with *Caesalpinia coriaria*.

Table 1: Tannins present in aqueous phenolic extract.

Extraction procedure	***Caesalpinia coriaria* (mg/g)**	***Anacardium occidentalis* (mg/g)**
Under reflux	5.97±0.000454	6.49±0.000654
Microwaves	6.91±0.000342	8.73±0.000221
Sonication	6.18±0.000769	6.66±0.000435

CONCLUSIONS

The aim of this study was to determine the amount of total tannin from *Caesalpinia coriaria* and *Anacardium occidentalis.* In traditional medicines the plants were used which was analysed in this study.

Under reflux extraction, microwave extraction and sonication these three extraction methods were compared in this study. Microwave extraction is the best choice for tannin extraction from dried plant material is determined. Sonication and under reflux extraction give similar results, but the extracted quantity is smaller. *Anacardium occidentalis* has highest content of tannins.

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