

Uv-specteophotometry to Determine the Content of Tanning Substance in Extract of Acacia Nilotica Seeds

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ABSTRACT

The present work was designed to quantify the tannin in the acacia nilotica from seeds *by the spectrophotometric method*. A simple and reproducible UV spectrophotometric method for the quantitative determination of tannins in acacia nilotica seeds was developed and validated. Therefore, in the present study an attempt has been made to determine the tannin content in acacia nilotica using Folin-Denis' method. A blue colored complex is formed by using tannic acid. The spectrophotometric method performed well in quantifying the tannin. The method showed the amount for tannin in the range of 3.447mg 3.815mg and 4.351mg in each extract distilled water, ethanol(99%) and acetone respectively.

Keywords: acacia, seeds, tannic acid, UV spectrophotometer.

1. INTRODUCTION

Tannins are amorphous, astringent substances occurring widely in the bark, wood, leaves, and resinous exudations of plants^{1,2}. They are water-soluble phenolic compounds which occur widely in vascular plants³. The term was introduced by Seguin in 1796 to describe the substances present in a number of vegetable extracts which possessed the property of converting animal skins into leather⁴. Most authors prefer to speak of "tannin extracts" rather than "tan- nin." The tannins are colourless and noncrystalline substances which form colloidal solutions in water; these solutions have an astringent taste^{5,6}. The

astringency of tannins, that is, their efficiency as precipitants of proteins in the mouth causing the sensation of astringency⁷⁻⁸, is determined by their reaction with salivary proteins in the oral cavity⁹. Astringency and tanning properties are associated with the higher molecular weight proanthocyanidins (condensed tannins)¹⁰. Tannins are polymeric phenolic compounds with numerous hydroxyl groups and quite diverse in chemical structure^{11,12}. Hydrolysis of some of the tannins yields. Tannins are complexed with the proteins of the hide and become an integral part of the final product. The ability of tannins to complex with proteins is largely responsible for the production of leather from hide¹³. One of the best sources of tannins is Acacia species which belong to family of Leguminosae in plant kingdom. There are about 800 species of the genus Acacia. They are abundant in savannas and arid regions¹⁴. The tannins can react with formaldehyde (condensation polymerization) to form thermosetting products that can be used as an adhesive. Antibacterial effectiveness of tannin contained in the plants such as acacia is influenced by the concentration of tannins. The spectrophotometry has been used as a quantification method, because of its simplicity and rapidity (Andrade, 1996). The Brazilian Pharmacopeia describes the methodologies based on the bonding of tannins with the skin powder and photometric determination at 691 nm of blue- color complexes derived from the reduction of the phosphotungsten reagents.

2. MATERIAL AND METHODS

Preparation of sample extract

- 1- Dried acacia seeds for 1 week. Once dried avocado seed blend to a powder and sieved using a sieve.
- 2- Weighed as much as 10 g of acacia seeds, soaked in Soxhlet in 150 mL of distilled water, ethanol and acetone for 24 hours and then filtered to obtain a filtrate. Treatment was for 3 days. Filtrate obtained together then evaporated to obtain ethanol and acetone extracts. The evaporated extract was cooled in a desiccator before further analysis.

Qualitative Determination of Tannin

To 0.5g of prepared extract, 1ml of distilled water and few drops of ferric chloride were added respectively. A blue-black, green or blue-green precipitate indicates the presence of tannins.

Quantitative Determination of Tannin

The Folin-Denis spectrophotometric method described by¹⁵ was used. After the extract prepared in above processing, 2.5ml of the supernatant (extract) was dispersed. Similarly, 2.5ml of standard tannic acid solution was dispersed into a separate 50ml flask. One milliliter (1.0ml) of folin-denis reagent was measured into each flask, followed by 2.5ml of saturated Na₂CO₃ solution. The mixture was diluted to mark in the flask (50ml) and

incubated for 90mins at room temperature. The absorbance was measured at 250nm in a Genway model 6000i electronic spectrophotometer. Readings were taken with the reagent blank at zero. The tannin content was given as;

$$\text{Percentage (\% Tannin)} = \frac{A_n \times C \times 100 \times V_f}{A_s \times W \times V_a}$$

Where:-

A_n =Absorbance of test sample

A_s =Absorbance of standard solution

C = Concentration of standard solution

W = Weight of sample used

V_f = Total volume of extract

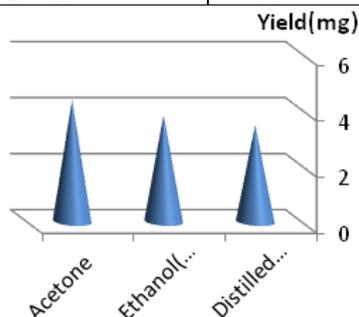
V_a = Volume of extract analysed

3. RESULTS AND DISCUSSION

The results showed that tannin was present in all the extracts of acacia seeds investigated. Total tannin content of acacia seeds extracts can be seen in Table 1. The content of total tannins expressed in mg / l of acid tannin. Table (1) shows that the highest content of total tannins (4.351mg) contained in the acetone extract tannin higher levels compared with the other extracts. While the less content of total tannins(3.447mg) contained in the distilled water extract. There is no single protocol for extracting tannins from all plant material. The procedures used for tannins are widely variable.¹⁶ It may be that acetone in the extraction solvent increases the total yield by inhibiting interactions between tannins and proteins during extraction.¹⁶ or even by breaking hydrogen bonds between tannin-protein complexes.¹⁷

Table (1): Tannin content in the acacia seeds which extracted with different solvents

Solvent	Yield(mg)
Distilled water	3.447
Ethanol(99%)	3.815
Acetone	4.351



The tannin content was measured using the acacia seeds which extracted with different solvents showed in figure (1):

4. CONCLUSION

We can conclude that, among the three *extracts* studied, *Acacia nilotica* is the richest in tannins content, and within the different solvents, absorbed that acetone is best solvent to get tannins content in *Acacia nilotica*, while distilled water were the least.

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