

Research Article

Preliminary Phytochemical Investigation on Bark and Leaf of *Aegle marmelos*

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ABSTRACT

The aim of the present study was to investigate the phyto-constituents in methanolic extract obtained from bark and leaf of *Aegle marmelos* along with estimation of total extractive values. Qualitative phytochemical analysis revealed the presence of phytochemicals in the Methanolic extract of bark and leaf of *Aegle marmelos* by TLC and Spectroscopic techniques. Different R_f (Retention factor) value of various phytochemicals provide valuable clue regarding their polarity and selection of solvents for separation of phytochemicals. The present study was also evaluating the difference of bioactive compounds in different plant parts (Bark & Leaf) of *Aegle marmelos*.

1. INTRODUCTION

Bael (*Aegle marmelos* Linn.), family Rutaceae is a moderate sized, slender, aromatic tree, 6.0 -7.5 m in height, and 90 to 120 cm in girth, with a somewhat fluted bole of 3.0-4.5 meter growing wild throughout the deciduous forests of India.^[1] It is indigenous to Indian sub continents and mainly found in tropical and subtropical

regions.^[2] The leaves, roots, bark, seeds and fruits of *Aegle marmelos* are edible. The medicinal properties of this plant have been described in the Ayurveda. In fact, as per Charaka (1500 B.C.), no drug has been longer or better known or appreciated by the inhabitants of India than the bael. The leaves of bael are astringent, laxative, expectorant and are useful in treating ophthalmia, deafness, inflammations, cataract, diabetes and asthmatic complaints. The

leaves are bitter and are used as a remedy for ophthalmia, ulcers, dropsy, cholera and beri beri. Fresh aqueous and alcoholic leaf extracts of *Aegle marmelos* are reported to have a cardiotoxic effect.^[3]

To check the legitimacy of the raw drugs and to detect adulteration of these materials, an authentic analytical pharmacognostic study (Phytochemical Study) is needed for each raw drug. Usually, the drugs are collected by traditional practitioners who have inherited Ayurvedic or other herbal practices. The objective of the present investigation was to screen the physicochemical characteristic of *Aegle marmelos* bark & leaf and also the major phytochemicals that would be attributed to the biological activity.

2. MATERIALS AND METHODS

2.1 Collection and authentication of plant materials:

The bark & leaf of *Aegle marmelos* were collected from medicinal plant garden, NIA, Jaipur (Raj.) during the month of October-2013 and authenticated by Dr. Mita Kotecha, HOD & Prof., Department of Dravyaguna, NIA, Jaipur (Rajasthan).

The Bark & leaf of *Aegle marmelos* were dried under shade. These dried materials were mechanically powdered, sieved (60#mesh) and stored in an airtight container. The powdered materials were used for further phytochemical testing.

2.2 Preparation of Extracts

The powdered plant material (bark & leaf) was extracted with methanol using Soxhlet Extraction method. Both the extracts were

filtered & the filtrate was concentrated in Rota evaporator. Dried extracts were used for further studies.

2.3 TLC Method

10 mg per ml of *Aegle marmelos* methanolic bark and leaf extracts were dissolved in methanol solvent and used for TLC examination. TLC plates (Precoated silica gel G₆₀ F₂₅₄) were taken and allowed to dry in hot air oven at 105⁰C for one and half hour. Samples were loaded with the help of capillary tube, 1 cm above the base of TLC plate. Then, it was dipped in mobile solution (Toluene, Ethyl acetate, 95:5 ratio). TLC plates were removed from the mobile solution immediately after the spot reached the one cm below the top of TLC plates. The chromatograms were observed under long and short UV range and were photographed. The Rf value was obtained by using the following formula.

$$R_f = \frac{\text{Distance travelled by the solute (cm)}}{\text{Distance travelled by the solvent (cm)}}$$

2.4 UV Spectroscopy Method

Methanolic extracts of bark & leaf of *Aegle marmelos* were diluted with methanol solvent & filtered then analyzed in UV-Visible range (190-1100 nm) using double beam UV-Visible Spectrophotometer (Electronics Corporation of India Ltd.). This method is useful for analyzing organic compounds viz. ketones, dienes and their conjugations etc.

Table1. Methanolic Extractive values of Methanolic extract of bark and leaf of *Aegle marmelos*

S. No.	Plant Part	Extractive Value* (%)
1.	Bark	9.46
2.	Leaf	14.5

*Values are in triplicate.

3. RESULTS AND DISCUSSION

3.1 Extractive Values

Estimation of extractive values determines the amount of the active constituents in a given amount of plant material when extracted with solvent. The extraction of any crude drug with a particular solvent yields a solution containing different phytoconstituents. The compositions of these phytoconstituents depend upon the nature of the drug and solvent used. Extractive value also gives the information regarding the quality of the drug.

Table 2. TLC Profile of different parts of *Aegle marmelos*

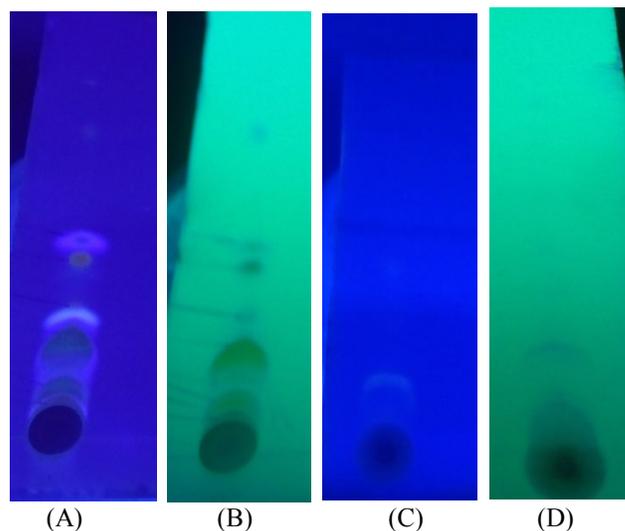
S. No.	Plant Part	UV Range	No. of Spots	Rf Values
1.	Bark	366 nm	07	0.92, 0.62, 0.54, 0.41, 0.36, 0.30, 0.16
2.	Bark	254 nm	06	0.94, 0.64, 0.54, 0.40, 0.29, 0.16
3.	Leaf	366 nm	03	0.77, 0.62, 0.30
4.	Leaf	254 nm	05	0.74, 0.53, 0.40, 0.28, 0.18

3.2 TLC Profile

For the pharmacological as well as pathological discovery of novel drugs, the essential information regarding the chemical constituents are generally provided by the qualitative phytochemical screening of plant extracts. TLC profiling of *Aegle marmelos* methanolic leaf extract gives an impressive result that directing towards the presence of number of phytochemicals. Various phytochemicals gives different Rf values in different solvent system.

This variation in Rf values of the phytochemicals provides a very important clue in understanding of their polarity and also helps in selection of appropriate solvent system for separation of pure

compounds by Column chromatography. Compound showing high Rf value in less polar solvent system have low polarity and with less Rf value have high polarity. Mixture of solvents with variable polarity in different ratio can be used for separation of pure compound from plant extract. The selection of appropriate solvent system for a particular plant extracts can only be achieved by analyzing the Rf values of compounds in different solvent system.^[4]



TLC Profiles of *Aegle marmelos* (A) Bark at 366 nm UV Range (B) Bark at 254 nm UV Range. (C) Leaf at 366 nm UV Range. (D) Leaf at 254 nm UV Range.

Figure 1. TLC Profile of Bark & leaf of methanolic extract of *Aegle marmelos*.

In the present state of affairs, TLC profiling of *Aegle marmelos* methanolic bark extract indicated seven spots in long UV and six spots in short UV light range. Methanolic leaf extract indicated three spots in long UV and five Spots in Short UV light range. Different Rf values of the compound also reflects an idea about their polarity. This information helps in selection of appropriate solvent system for further separation of compound from the plant extract.

Table3. UV Spectrum of different parts of *Aegle marmelos*.

S. No.	Plant Part	Wavelength	Absorbance
1.	Bark	377.0 nm	2.204
2.	Leaf	376.5 nm	2.309

3.3 UV Spectroscopy

UV-Visible spectra of methanolic extracts of bark and leaf of *Aegle marmelos* are shown in Fig. 2 & 3. The UV spectrum of bark extract showed absorption maxima at 377.0 nm and their absorbance was 2.204. The UV spectrum of bark extract showed absorption maxima at 376.5 nm and their absorbance was 2.309.

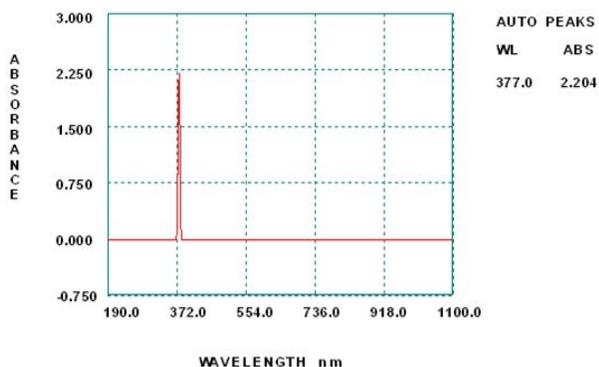


Figure 2. UV Spectrum of bark of methanolic extract of *Aegle marmelos*

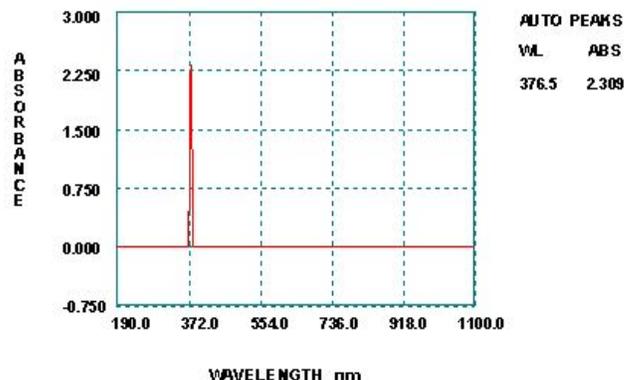


Figure 3. UV Spectrum of leaf of methanolic extract of *Aegle marmelos*

Conclusion:

The preliminary phytochemical investigation for methanolic extract of bark & leaf of *Aegle marmelos* were performed then inferred to calculate extractive value which were analysed by soxhlet apparatus. The results of phytochemical investigation including TLC & UV Spectroscopy revealed that in TLC, the bark having more phytochemicals than leaf of plant. In UV Spectroscopy, active phytochemicals may be same in different plant part of *Aegle marmelos*.

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