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Research article

Evaluation of physicochemical and volatile components of leaf ethanolic extract of *Averrhoa bilimbi*

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Abstract

Averrhoa bilimbi, L., of the family Oxalidaceae, is closely related to the carambola but quite different in appearance, manner of fruiting, flavor and uses. The common English names for this plant are cucumber tree and tree sorrel. This plant produces fruits which are edible. It is widely used by certain ethnic folks in the treatment of certain disorders. Chemical evaluations revealed that this plant is having a wide range of compounds which are terpenes in nature. Here a thorough study on the various physicochemical parameters and the various volatile components present in the ethanolic extract of leaf was done with the help of GCMS. It revealed that fourteen volatile components were present in the extract and of which Octanone was found to be the main one. Other physicochemical parameters were also performed. Based on this it was found to be good in nutritive value and also it contains good amount of saponins.

Key words: Averrhoa bilimbi, Oxalidaceae, Physicochemical, GCMS

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1. Introduction

Averrhoa bilimbi both belongs to the family *Oxalidaceae* is a common plants found in the southern part of India. Their fruits were edible and it is consumed by the public. Traditionally various parts of these plants especially fruits and leaves were widely used by the ethnic communities in the treatment of various disorders. Averrhoa bilimbi, L., of the family Oxalidaceae, is closely related to the carambola but quite different in appearance, manner of fruiting, flavor and uses. The common English names for this plant are cucumber tree and tree sorrel. The tree is very attractive, long lived and may reaches from 5-10 m in height. It has a short trunk dividing into a number of upright branches. The leaves are very similar to those of the Otaheite gooseberry and mainly clustered at the branch tips. They are alternate and imparipirmate, 30-60 cm long, with 11 to 37 alternate or sub opposite leaflets. They are ovate or oblong, with rounded base and pointed tip. It is downy, medium-green on the upper surface, pale on the underside 2-10 cm long, 1.2-1.25 cm wide.

2. Methodology [3-7]

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Various physicochemical parameters like ash values, extractive values, loss on drying, crude fibre content and forming index were done. Ash values performed here are total ash value, sulphated ash value and acid insoluble ash value. They give an idea about the amount of inorganic impurities present in the sample. Extractive values are performed with water and ethanol as the solvent. It helps in the selection of solvent for extraction. Loss on drying is an indicative about the amount of moisture content present in a sample and crude fiber content gives a primary idea about the nutritive value of a sample. Foaming index can be calculated by using the formulae 1000/a where a is the volume in ml of the decoction required to produce 1cm of foam from the series. Here for *Averrhoa carambola* Leaf extract the foaming index was found to be 200 where as that of fruit was found to be 500. For *Averrhoa bilimbi* the foaming index of the leaf extract was found to be 250 and that of fruit extract was 500. This is an indication about the presence of saponins in the extracts. GCMS evaluation [4] was performed in the ethanolic extract of the leaf for determining the volatile components present in the sample. GC-MS analysis was carried out on a GC clarus 500 Perkin Elmer system comprising a AOC-20i autosampler and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions: column HP-5 fused silica capillary column(30 ×320µm×0.25µm composed of 5%Phenyl Methyl Siloxane), operating in electron impact mode at 70eV; Nitrogen was used as carrier gas at a constant flow of 2.5ml/min and an injection volume of 10µL was employed (split ratio of 25:1) injector temperature 280°C; ion-source temperature 280°C. The oven temperature was programmed from 110°C which is isothermal for 2 min, with an increase of 10°C/min, to 200°C/min, then 5°C/min to 250°C/min, ending with a 13 min isothermal at 250°C. Mass spectra were taken at 70eV; a scan interval of 0.5 s and fragments from 40 to 550 Da.

3. Results and Discussion

The results of the various physicochemical constants were tabulated in table No. 1. It clearly indicates about the solvents suitable for the extraction. Also it indicates that the saponin contents were more in the sample since it gives a value of 500 on test of foaming index. GCMS Evaluation revealed the presence of 14 volatile components in the extract and the majoir one are octanone, terpenol, citral, ledol etc. Interpretation on mass spectrum of GC-MS was done using the database of Agilent network GC. The results are tabulated in the tables. The results were tabulated in table no. 2.

Table No. 1. Various physicochemical parameters of the ethanolic extracts of Averrhoa bilimbi leaf.

Sl. No.	Test	%w/w
1.	Total ash value	10.54
2.	Sulphated ash value	1.86
3.	Acid insoluble ash value	6.44
4.	Water soluble extractive value	9.64
5.	Alcohol soluble extractive value	11.39
6.	Loss on drying	5.8
7.	Crude Fiber Content	3.98

Table No. 2. GCMS Evaluation of ethanolic leaf extract of *Averrhoa bilimbi*

Sl. No.	Compound Name	Retention time in Minutes	Percentage composition of Volatile matter (w/w)	Percentage Probability
1.	Octanone	2.35	23.21	98%
2.	Hydroxy butanone	3.25	12.01	95%
3.	Hexynyl acetate	4.55	2.52	99%
4.	Octanol	18.25	5.26	96%
5.	Limonene	20.12	4.25	98%
6.	Cardinol	23.02	3.26	95%
7.	Elemol	25.42	11.02	97%
8.	Humulene oxide	28.45	3.02	99%
9.	Eudesmol	30.12	4.52	98%
10.	Ledol	30.25	2.02	95%
11.	Selinene	30.55	3.02	96%
12.	Amorphene	38.22	2.02	95%
13.	Citral	38.45	10.21	95%
14.	Terpinol	39.01	0.54	98%

Conclusion

Various physicochemical parameters were performed on the leaf ethanolic extract of averrhoa bilimbi and these values can be further used in the standardization of this plant. GCMS evaluation revealed the presence of 14 volatile components. This is only a primary study and further detailed study is required for the isolation of these compounds as well as their pharmacological evaluation.

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