Chemistry Research Journal, 2018, 3(3):88-91

Available online www.chemrj.org

Research Article

ISSN: 2455-8990
CODEN(USA): CRJHA5

Physicochemical and Phytochemical Characters of Bark Exudates of *Mangifera indica*

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Abstract The objective of the present study was to investigate the physicochemical and phytochemical properties of the gum exudates of *Mangifera indica*. The proximate composition were determined by using AOAC methods. Antioxidant capacity was determined using the free radical 2,2- diphenyl- 1-picrylhydrazyl (DPPH) method, The total phenolic contents were measured using Folin-Ciocalteu reagent assay according to the method described by [1] with some modifications. The gum was observed under Scanning electron microscope. Moisture, dry matter, crude fiber, crude fat, total ash, minerals and carbohydrates percentage of gum exudates of *Mangifera indica* are9.48 ± 0.61, 90.51 ± 0.61, 0.86 ± 0.22, 51.43 ± 1.28, 0.2 ± 0.10, 4.32 ± 0.54, 33.68 ± 0.55respectively. Antioxidant capacity; DPPH radical scavenging assay: IC_{50} value for gum exudates of *Mangifera indica*was 2.36 ± 0.63 mg of Gallic acid equivalents per mL .Total Phenol Content was 243.59 ± 0.27 ppm.

Keywords Antioxidant capacity, DPPH, *Mangifera indica*, Total phenol content

1. Introduction

Exudates are complex mixtures of organic compounds oozed by plants, often, but not always as a result of injury. These products are rich in carbon and hydrogen atoms and are also commonly called "sap" although the word "sap" is used to describe any fluid that travels inside plants. In contrast, the word "exudate" refers to any such material when it is oozed out of the plant [1-2]. Resin production is a common defensive response of many trees, particularly conifers, to external factors such as mechanical wounding [3]. Exudates are complex mixtures of organic compounds oozed by plants, often, but not always as a result of injury. Mangoes belong to the genus Mangifera of the family Anacardiaceae. Various parts of *M. indica* have found extensive uses in indigenous system of medicine. The stem exudates a gum resin is, used in dressings for cracked feet and for scabies [4]. A phytochemical investigation of mango stem bark extract has led to the isolation of seven phenolic constituents: gallic acid, 3,4-dihydroxy benzoic acid, gallic acid methyl ester, gallic acid propyl ester, mangiferin, (+)-catechin, (−)-epicatechin, and benzoic acid and benzoic acid propyl ester [5].

2. Materials and Methods

2.1 Plant material: The gum exudates of *Mangifera indica* (Mango gum) were collected from a garden in Piliyandala, Sri Lanka.

2.2 Preparation of homogeneous samples for proximate analysis: The gum exudates of *Mangifera indica*were collected and were kept in a LDPE cup at room temperature and was used for the proximate analysis in dry basis.

2.3 Checking the solubility in polar and non-polar solvent: 1 g of thoroughly mixed sample was dissolved in each of the solvents: 95% ethanol, Diethyl ether and cold/ hot water. The solution was allowed to stand for 30 min and the solubility of the sample in the different solvents was determined qualitatively.

2.4 Determination of Moisture Content (Oven Drying Method)

The moisture content was determined according to the AOAC (Association of Analytical Chemists) official method 925.10

2.5 Determination of Crude Protein Content (Micro Kjeldhal Method)

Crude Protein Content was determined according to the AOAC method 978.04

2.6 Determination of Total Fat (Majonnier Ether Extraction Method)

Total fat was determined according to the AOAC official method 922.06

2.7 Determination of crude fiber

The crude fiber content was determined according to AOAC 978.10

2.8 Determination of Total Ash (Gravimetric Method*)*

Total ash content was determined according to the AOAC official method 923.03 [6].

2.9 Determination of Metals

Dry ashing and the metals were quantified by Atomic Absorption Spectrometer (Thermo Scientific iCE 3000)

2.10 Determination of Carbohydrate

% Carbohydrate content m/m $= 100 - (\text{Total fat} + \text{Crude protein} + \text{Crude fibre} + \text{Total ash})$
(dry basis)

2.11 Total phenolic content (TPC)

Using Folin-Ciocalteu reagent assay according to the method described by [1] with some modifications.

2.12 Analysis of antioxidant activity

Using the DPPH method, the procedure followed the method of [7] with some modifications

2.13 Observing the gum samples under scanning electron microscope (SEM)

A Mango gum sample, was observed under the SEM.

3. Results and discussion

3.1 Solubility in different solvents.

The gum sample was insoluble in cold water, slightly soluble in hot water and 95% ethanol and highly soluble in di ethyl ether.

3.2 Results of proximate analysis of the stem exudates of *Mangifera indica*

Table 1: Results of proximate analysis of the stem exudates of *Mangifera indica*

Parameter	**Hik gum**
Moisture %	9.48 ± 0.61
Dry matter %	90.51 ± 0.61
Proximate analysis (g/100 g of dry waste)	
Crude protein %	0.86 ± 0.22
Crude fat %	51.43 ± 1.28
Crude fiber %	0.2 ± 0.10
Ash %	4.32 ± 0.54
Carbohydrates %	33.68 ± 0.55
Minerals (mg/100g) in dry basis	
Na	207.1 ± 0.01
K	776.0 ± 0.00
Ca	727.9 ± 0.09
Mg	190.0 ± 0.02
Fe	35.0 ± 0.01
Heavy metals (%) in dry basis	
Pb	0.00

3.3 Results of DPPH radical scavenging assay

Table 2: DPPH radical scavenging assay based on IC_{50} value (mg/mL) in different grape varieties under different treatments

	Mango gum
IC_{50} % value	2.36 ± 0.63

Results of the DPPH radical scavenging assay based on IC_{50} values for Mango gums is shown in Table 2. According to the DPPH radical scavenging assay, IC_{50} value is the antioxidant concentration in the gums that shows 50% inhibition activity of the DPPH free radical and it is indicated as mg of Gallic acid equivalents per ml of gum. Low IC50 value indicates higher antioxidant activity whereas high IC_{50} value indicates low antioxidant capacity.

3.4 Total Phenolic Content (TPC) of Mango gum

Results of the Total phenolic content obtained is given in Table 3

Table 3: TPC of Mango gum (mg Gallic acid equivalents per L)

	Mango gum
TPC	243.59 ± 0.27

Mango gum contains more polyphenolic compounds (2.738 ± 0.272 mg Gallic acid equivalents per L). A previous study states that mango stem bark extract has led to the isolation of seven phenolic constituents: gallic acid, 3,4-dihydroxy benzoic acid, gallic acid methyl ester, gallic acid propyl ester, mangiferin, (+)-catechin, (−)-epicatechin, and benzoic acid and benzoic acid propyl ester.

3.5 Images of Mango gum by Scanning Electron Microscope (SEM)

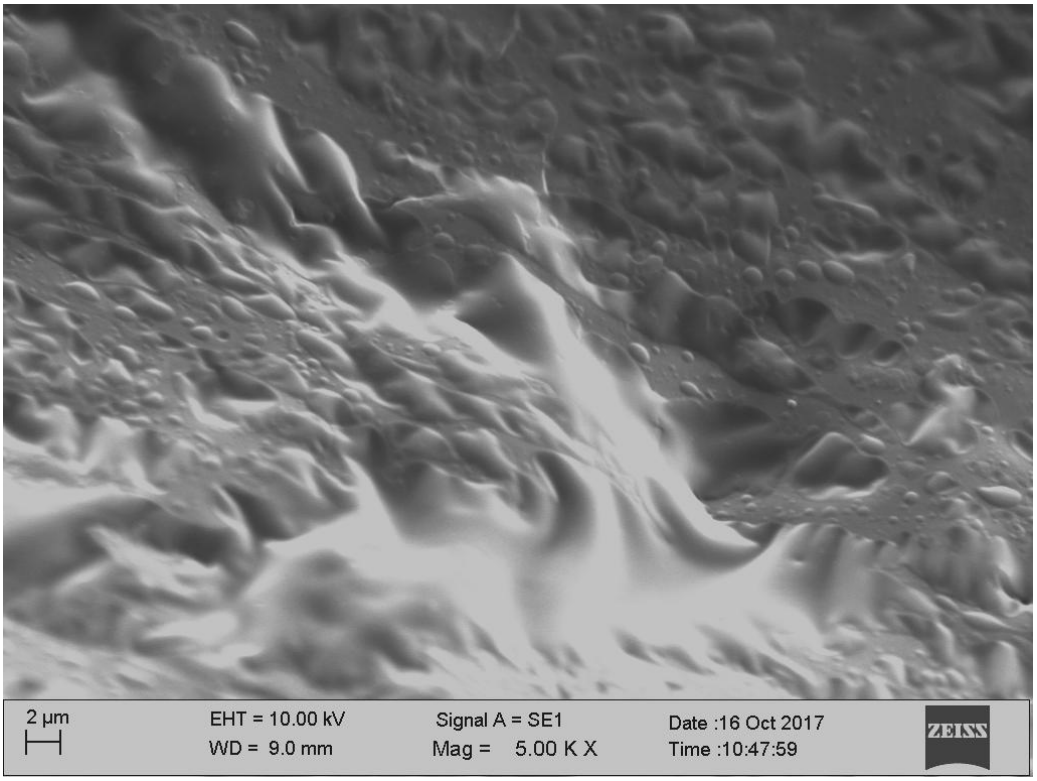

Figure 1: SEM image of mango gum exudate

4. Conclusion

Mango gum exudate contains a higher percentage of fat compared to carbohydrates, proteins, minerals, and moisture. Potassium is the mineral present in the highest concentration. It has a significant antioxidant activity and contains a significant phenolic content. The gum exudate is insoluble in polar solvents and soluble in non polar solvents.

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