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## Qualitative analysis of some important phytochemical constituents of *Moringa oleifera* (Lam) leaves and seeds

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### Abstract

*Moringa oleifera* (Lam.) is one of the most common medicinal plants and has wide uses in traditional medicine around the globe and its medicinal value due to availability of various phytochemical substances in different plant parts. The aim of the present study was to screen and quantify the amount of alkaloids, flavonoids, saponins, sterols and tannins in leaves and seeds of Moringa. Alkaloids, flavonoids, saponins, sterols and tannins were screened in aqueous, ethanol, methanol and chloroform extracts of leaves and seeds. The aqueous extract was found to be the best having all five constituents. The finding of the study gives an indication to expect pharmacological role for Moringa leaves and seeds that can be seen as a potential source of useful drugs

**Keywords:** *Moringa oleifera*, phytochemicals, leaves, seeds, extract

### Introduction

Medicinal plants still are the most available, reliable, and good source of active biomolecules for better health, medicines and nutritional supplements all over the world. The effect of the medicinal plants depends mainly on their phytochemical constituents that have an influence on the physiological activities of many living organisms. Some of the most important phytochemical constituents are alkaloids, flavonoids, saponins, sterols and tannins [1]. These phytochemicals have a role in control and prevention of cancer, heart disease [2], diabetes and high blood pressure regulation [3]. *Moringa oleifera* (Lam.) or Moringa tree is one of the most common species in family Moringaceae. Moringa present in many tropical and subtropical countries. The species is native to, Africa, Caribbean Islands, Himalaya, Middle East, Indo-Asia, South America, Pakistan and Pacific area and widely used as folkloric and traditional medicines [4]. The tree has many names such as drumstick, horseradish and miracle tree. Many reports have shown the nutritional and medicinal properties of Moringa [5].

### Material and Methods

#### Study area

The research work was carried out at Division of Aquaculture, ICAR- Central Institute of Fisheries Education, Mumbai - Maharashtra, India. Moringa leaves and seeds were collected from different trees around the CIFE campus in Versova area suburb of western Mumbai.

#### Plant materials

Fresh samples from Moringa leaves and seeds were submitted to Blatter Herbarium of ST. Xavier's College in Mumbai, India. The samples were identified and authenticated as *Moringa oleifera* (Lam). The samples matched with the herbarium specimen number NI. 4891 of N. A. Irani. For the research work, fresh and green leaves were collected and dried under shade at room temperature for 5 days. Seeds were removed from dry pods. The dried leaves and seeds were blended as fine powder using, normal electrical grinder and kept in air tight container for further analysis.

#### Plant extraction

Aqueous extract was prepared using method described by Awodele *et al.*, (2012) [6], 100 g of samples powder were macerated in 2 liters of distilled water (MILLPORE, Q-guard1) for 24

hours. The solution was decanted and filtered using Whatman filter paper No.1 (QUALIGEN- Germany). The filtrate was dried in oven (Hexatec, Model HIPL03A) at 40°C for 4days. The dry residues again were reconstituted in distilled water and used for the qualitative analysis. Chloroform extract was prepared using method described by Sathishkumar and Baskar, (2014) <sup>[7]</sup>. 100 g sample powder was added to 400 ml chloroform and was shaken in water bath for ten hours. The solution then was filtered using Whatman filter paper No. 1. The filtrate was concentrated using Rotary evaporator (IKA, model RV10B) to get the residue. The dry residue again was dissolved in same amount of the solvent and used for the further analysis. Ethanol extract was prepared using method described by Olatunde and Dikwa, (2014) <sup>[1]</sup>, 80 g of the sample powder was added to 400 ml ethanol (98%) for 72hours. The solution was filtered using Whatman filter paper No. 1. The filtrate was concentrated using rotary evaporator. The residue was again dissolved in same amount of the solvent and was used for the further analysis. Methanol extract was prepared using method described by Pavithra, *et al.*, (2009) <sup>[8]</sup>, 50 g of the sample powder was added into a round beaker containing 500 ml of Methanol for 24 hours and the solution then was filtered using Whatman filter paper No.1. The filtrate was evaporated at room temperature to get the dry extract which was dissolved in same amount of the methanol and stored for the further analysis.

#### Qualitative screening of bioactive components

Each extract was tested for presence of alkaloids, flavonoids, saponines, sterols and tannins using different methods. The tests were repeated in triplicates to ensure the accurate results.

#### Test of alkaloids

The occurrence of alkaloids was tested using method reported by Sabri *et al.*, (2012) <sup>[9]</sup>. 10 ml of the extract were evaporated to dryness. Two ml of 2% HCL acid was added to the dry residue. Few drops of Wagner's reagent were added to the solution. The presence of alkaloids was confirmed when reddish brown precipitate occurred.

#### Test of flavonoids

The test was based on method described by Pamar *et al.*, (2012) <sup>[10]</sup>. Few drops of NaOH were added to two ml of the extract and intense yellow color appeared. Few drops of dilute HCL were added and the solution turned to colorless as indicator of presence of flavonoids.

#### Test of saponins

Precipitation and foam test method was described by Devmurari, (2010) <sup>[11]</sup>. Few drops of (1%) lead acetate solution were added to one ml of the extract. Intense white precipitate appeared due to presence of Saponins. Foam test also confirmed presence of saponins in the extract, in which 20 ml of distilled water was added to one ml of the extract in graduated cylinder. The solution was shaken for 5 to15 minutes and formation of stable foam indicated the presence of saponins.

#### Test of sterols

The test was performed based on method described by Solihah *et al.* (2012) <sup>[12]</sup>. Two ml concentrated sulphuric acid were added to two ml of the extract. Formation of red precipitate indicated presence of sterols.

#### Test of tannins

The test method was described by Ugochuhwu *et al.*, (2013)

<sup>[13]</sup>. One ml of 3% of Ferric chloride was added to one ml of the extract. Brownish green color development indicated presence of tannins.

#### Result and Discussion

In the present study, preliminary phytochemical screening for leaves and seeds extract of *M. oleifera* revealed the presence of alkaloids, flavonoids, saponins, sterols and tannins (Table1). In the leaves, alkaloids were presented in aqueous and ethanolic extracts but were absent in methanolic and chloroform extracts. In seeds alkaloids were available in aqueous, methanolic and chloroform extract but absent in the ethanolic extract. In leaves, flavonoids were presented in aqueous, ethanolic, methanolic and chloroform extracts. In seeds flavonoids were also available in ethanolic and chloroform extracts but absent in aqueous and methanolic extracts. In leaves, saponins were revealed in aqueous and chloroform extracts but absent in ethanolic and methanolic extracts. In seeds, saponins were also available in aqueous, ethanolic, and chloroform extracts but absent in methanolic extract. Sterols were available in aqueous, ethanolic, methanolic and chloroform extracts of both leaves and seeds. Tannins were presented in aqueous, ethanolic. Methanolic and chloroform extracts of leaves. In seeds tannins were available in aqueous, ethanolic, and methanolic extracts but absent in the chloroform extract. Phytochemical screening or qualitative analysis revealed the chemical constituents or the secondary metabolites of the plant extract or tissue in different plant part. The phytochemical screening of *Moringa oleifera* (Patel *et al.*, 2014) <sup>[14]</sup> exhibits presence of alkaloids, flavonoids, saponins, sterols and tannins in both aqueous and ethanolic extract of leaves. Previously Arya *et al.*, (2012) <sup>[15]</sup> reported the presence of alkaloids, flavonoids, saponins, sterols and tannins in aqueous, ethanol, ether and chloroform extracts in leaves of *Psidium guajava* L. Phytochemical screening and analysis of *Citrullus colocynthis* L. seeds revealed presence of flavonoids and tannins in both aqueous and hydro-methanolic extracts and absence of alkaloids from the same extracts (Benariba *et al.*, 2013) <sup>[16]</sup>. Generally, plant secondary metabolites are considered as good and unique sources for pharmaceuticals and food supplements. Various roles of many phytochemical constituents were reported in many studies. The importance of alkaloids, sterols, saponins and tannins come from their uses as antimicrobial for treating many diseases (Kubmarawa, 2007) <sup>[17]</sup> and (Mensah, 2008) <sup>[18]</sup>. Phytosterols and flavonoids have a role as immunomodulatory, anti-cancer, antioxidants, and anti-inflammatory agents (Laparra and Sanz, 2010) <sup>[19]</sup>. Alkaloids are capable of reducing headaches resulting from hypertension (Ayitey and Addae, 1977) <sup>[20]</sup>, alkaloids also have anti-microbial and anti-fungal properties, flavonoids have role in preventing liver peroxidation and anti-cancer properties, and sterols have anti-metastatic activity (Saxena *et al.*,2013) <sup>[21]</sup>.

#### Conclusion

The qualitative screening for secondary metabolites in *M. oleifera* leaves and seeds has exerted good solubility in the various solvents and the quantitative test exhibited large amount of those metabolites that can give an indication for expected pharmacological role for Moringa leaves and seeds that can be seen as a potential source of useful drugs. Further studies are needed in order to isolate, identify and characterize the structure of those secondary metabolites.

**Table1:** Phytochemical screening of Moringa leaves and seeds extracts

Plant part	Presence(+)/Absence (-) of secondary metabolites							
	Leaves				Seeds			
	Solvent				Solvent			
Constituent	Aqueous	Ethanollic	Methanollic	Chloroform	Aqueous	Ethanollic	Methanollic	Chloroform
Alkaloids	+	+	-	-	+	-	+	+
Flavonoids	+	+	+	+	+	+	-	+
Saponines	+	-	-	+	+	+	-	+
Sterols	+	+	+	+	+	+	+	+
Tannins	+	+	+	+	+	+	+	-

**Declaration of interest**

Authors report no conflict of interest regarding present work.

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