



Research Article

PHYTOCHEMICAL AND PHARMACOGNOSTICAL EVALUATION OF STEM BARK AND FRUIT POWDER OF SPANISH CHERRY TREE

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ABSTRACT

The aim of the present work is to evaluate the phytochemical and pharmacognostic standard of bark and fruit of *Mimusops elengi* L. (Spanish cherry tree). The result of phytochemical screening revealed that bark and fruit contain saponin, terpenoids, flavonoids, steroids, tannins, phenols, carbohydrates, proteins while absences of alkaloids. Total ash content was higher in bark followed by ripe and unripe fruit while acid insoluble ash was higher in bark followed by unripe and ripe fruit. Water soluble ash was higher in bark followed by ripe and unripe. Foaming index was found to be less than 100 while swelling index was higher in bark. Fluorescence and organoleptic evaluation was also carried out. Thus, the result of the present study is useful in the identification of crude drug and help in preparation of monograph of the plant.

Key Words: Spanish cherry tree, phytochemical, pharmacognostic, Fluorescence, organoleptic.

INTRODUCTION

Medicinal plants are believed to be with healing powers, and people have used them for many centuries to maintain health, as well as to prevent, diagnose, improve or treat physical sufferings all over the world. Herbal medicines are becoming popular in both developing and developed countries because of their natural origin and less side effects. In present time medicinal plants and their products are employed as home remedies as well as playing important role in the development of novel and useful drugs used in modern medicine. Therefore, accurate determination of drug identity forms an essential part towards standardization of the plant material as medicine. Pharmacognostic study is a reliable tool towards the process of standardization¹⁻³.

Mimusops elengi L. commonly known as “Spanish cherry tree” belongs to family Sapotaceae. It is well known for its ayurvedic medicine. All parts of the plant have medicinal properties. Bark is acrid, sweet. It possesses cardiotonic, alexipharmic, astringent properties and used to cure biliousness, diseases of the gums and teeth. Unripe fruit is used as masticatory and helps to fix loose teeth. Ripe fruit pulp is useful in chronic dysentery. The bark and fruit of this plant are used in the treatment of diarrhea and decoction of the bark is used as a gargle⁴⁻⁵. Therefore, the objective of the present work is to evaluate various pharmacognostic and phytochemical properties of bark and fruit.

MATERIALS AND METHODS

COLLECTION AND AUTHENTICATION OF PLANT

Fresh bark and fruit of *Mimusops elengi* L. were collected from the campus of D. D. U. Gorakhpur University. The bark and fruit were washed and dried under shade. The dried bark and fruit were

then pulverized with the help of mechanical grinder and kept in sealed jar at 4 °C temperature in refrigerator.

PREPARATION OF PLANT EXTRACTS

For preparation of extracts dried powder of bark and fruit were extracted with different Polar and Non Polar solvent (Methanol, Methanol 80%, Ethanol, Ethanol 80%, Acetone, Chloroform, Ethyl Acetate, Water) using soxhlet apparatus. After effective extraction solvents were concentrated using rotatory evaporator under reduced pressure. The crude extracts were weighed and its percentage yield was recorded.

QUALITATIVE PHYTOCHEMICAL SCREENING

For the qualitative phytochemical screening of bark and fruit extracts standard procedures were followed to trace out the presence of active biomolecule i.e. Alkaloids, Saponins, Flavonoids, Steroids, Terpenoids, Tannins, Phenols, Carbohydrates, Proteins, Amino acids and Glycosides by Harborne, 1973; Trease and Evans, 1989; and Sofowara, 1993⁶⁻⁹.

PHYSICO-CHEMICAL PARAMETERS

Fluorescence Analysis (F.A.)

A small quantity of dried and finely powdered bark and fruit was treated with different reagents such as conc. HCl 50%, conc. HCl, conc. HNO₃, conc. HNO₃ 50%, conc. H₂SO₄ 50%, conc. H₂SO₄, 1N NaOH in H₂O, 1N NaOH in methanol, 5% FeCl₃, glacial acetic acid, benzene, ammonia, methanol, ethanol and allowed to stand for 2-3 minutes. Then the powdered was examined in day and UV light. The color observed by treatment of different

reagents was recorded as per the methods of Kokoski et al., 1958; Chase and Pratt, 1949¹⁰⁻¹¹.

Loss on drying

Two gm of sample was weighed in a pre-weighed porcelain dish. It was kept in hot air oven at 105 °C for 5 hrs. Then it was cooled in desiccators and weighed. The procedure was repeated till the constant weight was obtained¹².

Organoleptic evaluation

Organoleptic evaluation was observed by various sensory parameters of the plant materials, such as colour, odour, consistency and taste of the bark and fruit¹³.

Total Ash

About Two gm each of powdered parts were accurately weighed and taken separately in silica crucible. The powder was incinerated gradually by increasing temperature to make it dull red hot until free from carbon. The crucible was cooled and weighed. The procedure was repeated to get constant weight¹².

Acid insoluble ash

Ash was boiled with 25 ml dilute HCl (2N) for five minutes. The insoluble matter collected on an ashless filter paper, washed with hot water and ignited at a temperature not exceeding 450 °C to a constant weight.

Water-soluble ash

Ash was dissolved in distilled water and the insoluble part collected on an ashless filter paper and ignited at 450 °C to constant weight. By subtracting the weight of insoluble part from that of the ash, the weight of soluble part of ash was obtained.

Foaming index (F.I.)

One gm of the plant material was reduced to a coarse powder, weighed accurately and transferred to a 500 ml conical flask containing 100 ml of boiling water. It was boiled for 30 minutes, cooled and filtered into 100 ml volumetric flask. Sufficient water was added through the filter paper to dilute to volume. The decoction was poured into 10 stoppered test tubes in successive portions of 1 ml, 2 ml etc. up to 10 ml. The volumes in these test tubes were made up with water up to 10 ml. The test tubes were stoppered and shaken. It was allowed to stand for 15 minutes. and height of the foam measured and foam index calculated¹².

Swelling Index (S.I.)

Two gm of plant material was accurately weighed. It was taken into 25 ml glass stoppered measuring cylinder and 25 ml of water was added. The mixture was shaken thoroughly every 10 minutes for 1 hrs. It was allowed to stand for 3 hrs at room temperature and readings recorded¹².

Table 1: Preliminary Phytochemical Screening of *Mimusops elengi* L. Bark

Chemical constituent	Tests	Colour	Extracts				
			ME	EE	CE	AE	AqE
Alkaloids	Mayer's	Cream	-	-	-	-	-
	Hager's	Reddish brown					
	Wagner's	Reddish brown					
Saponins	Foam	-	++	+	+	+	+++
Glycosides	Keller-killiani	Reddish brown	+	++	-	+	++
	Borntragers	Reddish pink	+	+	-	+	++
Flavonoids	Alkaline	Yellow	+++	+++	+	++	++
Steroids /Terpenoids	Libermann-Burchard	Green/Red	+++	+++	++	+++	+++
	Salkowski test	Red/Yellow	+++	+++	++	+++	+++
Tannins &Phenols	Ferric chloride	Blue black	+++	+++	+++	+++	+++
Carbohydrates	Benedict's	Red precipitate	+++	+++	-	++	+++
	Fehling's test	Brick red	+++	++	-	++	+++
Proteins and Amino acids	Ninhydrin test	Violet color	+	+	-	+	++
	Biuret test	Purple	+	+	-	+	+

ME-Methanol extract, EE- Ethanol extract, CE- Chloroform extract, AE- Acetone extract, AqE- Aqueous extract

Table 2: Preliminary Phytochemical Screening of *Mimusops elengi* L. Unripe Fruit

Chemical constituent	Tests	Colour	Extracts				
			ME	EE	CE	AE	AqE
Alkaloids	Mayer's	Cream	-	-	-	-	-
	Hager's	Reddish brown					
	Wagner's	Reddish brown					
Saponins	Foam	-	+	++	-	+	+++
Glycosides	Keller-killiani	Reddish brown	-	-	-	-	+
	Borntragers	Reddish pink	-	-	-	-	-
Flavonoids	Alkaline	Yellow	+++	+++	+	++	+++
Steroids /Terpenoids	Libermann-Burchard	Green/Red	+++	+++	+	+	++
	Salkowski test	Red/Yellow	+++	++	+	++	+++
Tannins &Phenols	Ferric chloride	Blue black	+++	+++	+++	+++	+++
Carbohydrates	Benedict's	Red precipitate	+++	+++	-	+	+++
	Fehling's test	Brick red	+++	+++	-	+++	+++
Proteins and Amino acids	Ninhydrin test	Violet color	+	+	-	+	+
	Biuret test	Purple	+	+	-	+	+

ME-Methanol extract, EE- Ethanol extract, CE- Chloroform extract, AE- Acetone extract, AqE- Aqueous extract

Table 3: Preliminary Phytochemical Screening of *Mimusops elengi* L. Ripe Fruit

Chemical constituent	Tests	Colour	Extracts				
			ME	EE	CE	AE	AqE
Alkaloids	Mayer's	Cream	-	-	-	-	-
	Hager's	Reddish brown					
	Wagner's	Reddish brown					
Saponins	Foam	-	++	++	-	+	+++
Glycosides	Keller-kiliani	Reddish brown	-	-	-	-	-
	Borntragers	Reddish pink	-	-	-	-	-
Flavonoids	Alkaline	Yellow	+++	+++	++	+	+++
Steroids /Terpenoids	Libermann-Burchard	Green/Red	+++	+++	++	++	+++
	Salkowski test	Red/Yellow	+++	+++	+++	+++	++
Tannins & Phenols	Ferric chloride	Blue black	+++	+++	++	++	+++
Carbohydrates	Benedict's	Red precipitate	+++	+++	-	++	+++
	Fehling's test	Brick red	++	+++	-	++	+++
Proteins and Amino acids	Ninhydrin test	Violet color	+	+	+	+	+
	Biuret test	Purple	+	+	+	+	+

ME-Methanol extract, EE- Ethanol extract, CE- Chloroform extract, AE- Acetone extract, AqE- Aqueous extract

Table 4: Physiochemical parameters of *Mimusops elengi* L. Bark and Fruit

Ash content	Bark	Unripe Fruit	Ripe Fruit
Total ash	4.75±0.3	2.41±1.3	3.41±0.8
Acid insoluble ash	3.26±0.8	2.90±1.5	0.5±0.2
Water soluble ash	4.1±0.1	2.5±0.5	0.7±0.32
Moisture content	4.85±0.57	1.21±0.71	1.46±0.05
Foaming index	less than 100	less than 100	less than 100
Swelling index	21.6±1.52	19.2±0.6	20.2±1.7

Table 5: Percentage Yield of different extract of *Mimusops elengi* L. Bark and Fruit

Solvents	Bark	Unripe Fruit	Ripe Fruit
Methanol	36.68 ± 1.55	21.11 ± 1.31	16.06 ± 0.80
Ethanol	62.2 ± 0.91	32.78 ± 1.15	49.91 ± 1.62
Chloroform	37.79 ± 1.00	22.83 ± 0.88	4.03 ± 0.94
Acetone	41.20 ± 1.11	27.58 ± 1.01	16.57 ± 1.02
Aqueous	28.77 ± 0.64	32.33 ± 1.70	46.96 ± 1.44
Ethyl Acetate	39.32 ± 1.50	37.93 ± 1.67	7.61 ± 0.55

Table 6: Organoleptic characters of *Mimusops elengi* L. Bark

Solvents	Color	Taste	Consistency	Odor
Methanol	Brown	Bitter	Solid	Characteristic
Ethanol	Brown	Bitter	Solid	Characteristic
Chloroform	Light brown	Bitter	Solid	Characteristic
Acetone	Brown	Bitter	Solid	Characteristic
Aqueous	Brown	Bitter	Solid	Characteristic

Table 7: Organoleptic characters of *Mimusops elengi* L. Unripe Fruit

Solvents	Color	Taste	Consistency	Odor
Methanol	Light brown	Bitter	Solid	Fruity
Ethanol	Light brown	Bitter	Solid	Fruity
Chloroform	Light brown	Bitter	Solid	Fruity
Acetone	Greenish brown	Bitter	Semi Solid	Fruity
Aqueous	Light brown	Bitter	Semi Solid	Fruity

Table 8: Organoleptic characters of *Mimusops elengi* L. Ripe Fruit

Solvents	Color	Taste	Consistency	Odor
Methanol	Yellow	Sweet	Semi solid	Fruity
Ethanol	Yellow	Sweet	Semi solid	Fruity
Chloroform	Yellow	Sweet	Semi solid	Fruity
Acetone	Yellow	Sweet	Semi solid	Fruity
Aqueous	Yellow	Sweet	Semi solid	Fruity

Table 9: Fluorescence analysis of Bark powder of *Mimusops elengi* L.

Powder Treatment	Ordinary light	UV light
Powder + conc. HCl 50%	Brown	Dark Brown
Powder + conc. HCl	Brown	Brownish Black
Powder + conc. HNO ₃	Orange	Reddish Brown
Powder + conc. HNO ₃ 50%	Brown	Brownish Black
Powder + conc. H ₂ SO ₄ 50%	Brown	Black
Powder + conc. H ₂ SO ₄	Brown	Black
Powder + 1N NaOH in H ₂ O	Dark Red	Reddish Brown
Powder + 1N NaOH in methanol	Light Brown	Grayish
Powder + 5% FeCl ₃	Light Brown	Blackish Green
Powder + glacial acetic acid	Brick Red	Brown
Powder + benzene	Brick Red	Dark Red
Powder + NH ₃	Dark Brown	Black
Powder + methanol	Brown	Dark Brown
Powder + ethanol	Brown	Dark Red

Table 10: Fluorescence analysis of Uuripe Fruit powder of *Mimusops elengi* L.

Powder Treatment	Ordinary light	UV light
Powder + conc. HCl 50%	Light Brown	Dark Brown
Powder + conc. HCl	Brown	Dark Brown
Powder + conc. HNO ₃	Brown	Dark Brown
Powder + conc. HNO ₃ 50%	Brown	Brown
Powder + conc. H ₂ SO ₄ 50%	Greenish Brown	Pinkish White
Powder + conc. H ₂ SO ₄	Brownish Black	Black
Powder + 1N NaOH in H ₂ O	Dark Brown	Grayish
Powder + 1N NaOH in methanol	Greenish Brown	Pink
Powder + 5% FeCl ₃	Black	Black
Powder + glacial acetic acid	Light Brown	Pink
Powder + benzene	Dark Brown	Pink
Powder + NH ₃	Light Brown	Dark Brown
Powder + methanol	Light Brown	Light Brown
Powder + ethanol	Brown	Brown

Table 11: Fluorescence analysis of Ripe Fruit powder of *Mimusops elengi* L.

Powder Treatment	Ordinary light	UV light
Powder + conc. HCl 50%	Greenish Brown	Greenish Brown
Powder + conc. HCl	Brown	Olive Green
Powder + conc. HNO ₃	Dark Brown	Brown
Powder + conc. HNO ₃ 50%	Brown	White
Powder + conc. H ₂ SO ₄ 50%	Creamy White	Creamy White
Powder + conc. H ₂ SO ₄	Brownish Black	Brownish Black
Powder + 1N NaOH in H ₂ O	Light Brown	Grayish
Powder + 1N NaOH in methanol	Greenish Brown	Grayish
Powder + 5% FeCl ₃	Black	Black
Powder + glacial acetic acid	Yellow	White
Powder + benzene	Light Brown	Light Green
Powder + NH ₃	Yellow	White
Powder + methanol	Yellow	Creamy White
Powder + ethanol	Yellow	Creamy White

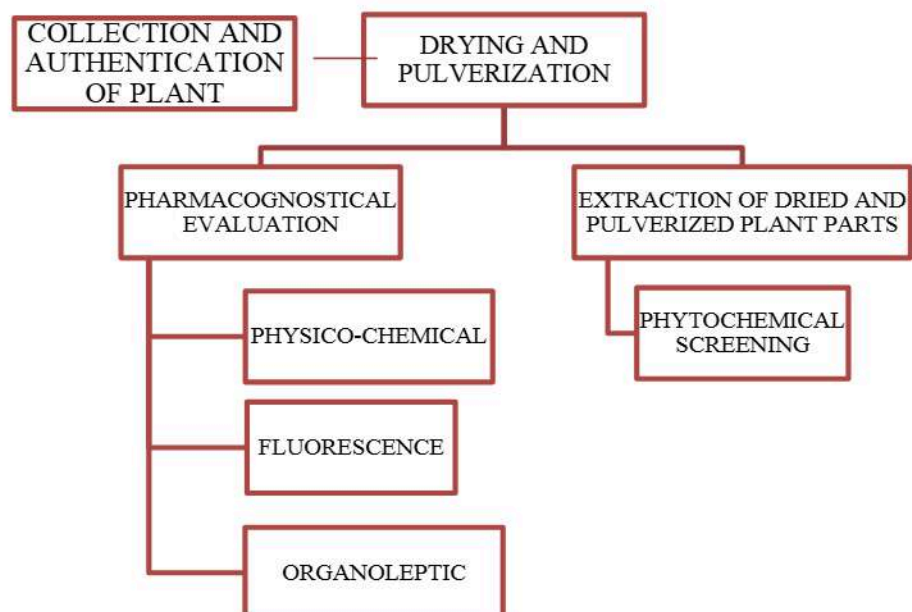


Figure: 1 Procedure of Pharmacognostic and Phytochemical Evaluation



Figure: 2 Powder of Bark



Figure: 3 Powder of Ripe fruit



Figure: 4 Powder of Unripe fruit



Figure: 5 Fruit Extraction through Soxhlet

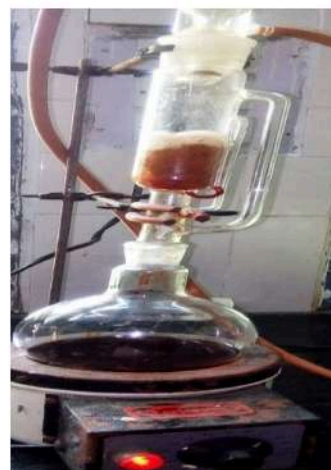


Figure: 6 Bark Extraction through Soxhlet

RESULT

Preliminary Phytochemical Screening

The crude drug extracted in different solvents was subjected to various chemical tests for the detection of secondary plant metabolites. The result revealed the presence of tannin, saponins, terpenoids, steroids, phenols, carbohydrates, flavonoids, and glycosides while absences of alkaloids were reported from bark and fruit (Table 1, 2 and 3).

Physico-chemical parameters

The physicochemical analysis of crude drug of *Mimusops elengi* L. is mentioned in Table 4. The extractability of crude drug in different solvents was shown in Table 5. The value of Total ash content in bark was 4.75 ± 0.3 ; acid insoluble ash 3.26 ± 0.8 and water soluble ash was 4.1 ± 0 . However, the total ash content of unripe and ripe fruit were 2.41 ± 1.3 and 3.41 ± 0.8 ; acid insoluble ash 2.90 ± 1.5 and 0.5 ± 0.2 whereas water soluble ash was 2.5 ± 0.5 and 0.7 ± 0.32 respectively. The result revealed that total ash content was higher in bark followed by ripe and unripe fruit while acid insoluble ash was higher in bark followed by ripe and unripe fruit. Water soluble ash was higher in bark followed by ripe and unripe. The value for loss on drying at 105°C of bark was higher (4.85 ± 0.57) followed by ripe fruit (1.46 ± 0.05) and unripe fruit (1.21 ± 0.71). Foaming index was found to be less than 100 while swelling index was higher in bark 21.6 ± 1.52 followed by ripe 20.2 ± 1.7 and unripe 19.2 ± 0.6 . The result of organoleptic evaluation and fluorescence analysis are shown in Table 6-11. The organoleptic properties of bark, unripe fruit and ripe fruit is substantial for the further use as food and medicine while the fluorescence property show the shiny and color intensity of biomolecule available in different solvents and can be bioprospected for further use in day to day life.

CONCLUSION

The traditional medicament has gained wide acceptance in the field of pharmaceuticals during last few years. Herbal drugs are mostly preferred because they are affordable by each and every class of the society and have no side effects. Therefore, the present demand compels the researchers to screen various traditional claims scientifically. Therefore, the pharmacognostic evaluation of herbal drugs is important criteria towards standardization. Thus the present study helps in identification,

standardization as well as profiling and future monograph development of crude drug.

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