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A comparative study of the different parts of *Acacia arabica* (Desi Babool) & *Prosopis julifera* (Vilayati Babool)

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Abstract

Natural products are products from various natural sources, plants, microbes and animals. They can be an entire organism (e.g. a plant, an animal or a micro-organism), a part of an organism (e.g. leaves or flowers of a plant, an isolated animal organ). The present study was aimed at pharmacognostical study. Plants *Acacia Arabica* and *Prosopis julifera* were studied for pharmacognostical characteristic, namely, morphology, microscopy, physicochemical, parameters which can be of utilized in identification and Authentication of plants. Successive, extractive and phytochemical screening revealed the present of tannin alkaloids, steroids and terpenoids in various extracts however most of the medicinally potential phytoconstituents were present in alcoholic and aqueous extracts, result shows that the leaf of *Acacia arabica* had maximum moisture content followed by stem bark, and twig, while *Prosopis julifera* twig had maximum moisture content followed by bark and twig. *Acacia arabica* has more percentage of Ash content followed by stem bark and twig. But in *Prosopis julifera* twig contain maximum percentage followed by stem bark and twig. Leaf of *Acacia arabica* has maximum percentage of Ash content. In-vitro DPPH free radical scavenging activity of the methanolic extract of all the parts of *Acacia Arabica* and *Prosopis julifera*. were compared with Ascorbic acid and quercetin (standard used) was observed which showed that extract of Arabica leaf shows higher activity followed by bark, and twigs. At a concentration of 0.1 mg/ml the scavenging activity of the leaf reached 62.34%, while at the same concentration bark and twig have 52.3% and 52.35% activity, Prosopis leaf have minimum 40.88% activity and twig and bark have 49.4% and 50% activity. we have done the comparative pharmacognostical study between *Acacia arabica* and *Prosopis julifera* and conclude that *Acacia arabica* plays more significant role and has more scientific value.

Keywords: *Acacia arabica* (Desi Babool), *Prosopis julifera* (Vilayati Babool)

1. Introduction

1.1 The origin, scope and practice of Pharmacognosy

The history of herbal medicines is as old as human civilization. The documents, many of which are of great antiquity, revealed that plants were used medicinally in China, India, Egypt and Greece long before the beginning of the Christian era. One of the most famous surviving remnants is *Papyrus Ebers*, a scroll some 60 feet long and a foot wide, dating back to the sixteenth century before Christ. (Kokate, *et al*, 2008) Indians also, worked meticulously to examine and classify the herbs which they came across, into groups called Gunas. Charaka made fifty groups of ten herbs each of which, according to him, would suffice an ordinary physician's need. Similarly, Sushruta arranged 760 herbs in 7 distinct sets based on some of their common properties. A large portion of the Indian population even today depends on the Indian System of Medicine – Ayurveda, 'An ancient science of life'. The well-known treatises in Ayurveda are Charaka Samhita and Sushruta Samhita. The first pharmacist, Galen, was known to have had a number of pain relieving materials, including opium in his apothecary. (Agrawal and Paridhavi 2007).

2. Materials and Method

2.1 Botanical study

2.1.1 Materials, Instruments and Chemicals: Plant materials, glass slide, grinding mixer, hot air oven, silica crucible, ash less filter paper (Whatman no.44), petridish, stoppered conical flask, rotary flask shaker alcohol (95%), chloroform water, chloral hydrate solution, water.

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2.1.2 Collection of plant: The plant materials were collected from the Rae Bareilly and Lucknow

2.1.3 Authentication of plant: The materials were authenticated at National Botanical Research Institute (NBRI), Lucknow, India. Sample specimens have been identified as *Prosopis julifera* (SW.) DC. Accession no. for the specimen is 98156, and *Acacia arabica* (Lam.) Willd., accession no. 98157 of the family Fabaceae to the National Herbarium of NBRI, Lucknow, India.

2.1.4.1 Macroscopical Study: It included determination of size, shape, surface characteristics, texture and fracture characteristics.

2.1.4.2 Microscopical Study: (Khaton Sayyada and Mehrotra Shanta)

(a) Stem Bark: Materials of bark were broken into pieces of about 1-2 cm long and 0.5-1 cm wide and boiled in a test tube for 1-3 minutes, to make it soft. Soft pieces were then cut into T.S. forms. Cut sections were dehydrated with a successive series of ethanol (i.e.30, 50, 70 and 80 per cent v/v) before staining with saffranine solution (1% solution of saffranine in 50% alcohol w/v). The sections were mounted on glass slides in 50% (v/v) glycerine and covered with cover slip. All samples were examined under the microscope and photographs were taken.

(b) Leaf: The leaf was cut into small squares of 1-2 cm and treated with concentrated aqueous chloral hydrate to make the leaf colorless. As the leaves were thick and was taking time to be cleared. The section cutting of leaf were done by cutting the leaf into small pieces and keeping it in between the potatoes to get the fine section and staining the section with saffranine solution (1% solution of saffranine in 50% alcohol w/v). The sections were mounted on glass slides in 50% (v/v) glycerine and covered with cover slip. All samples were examined under the microscope and photographs were taken.

(c) Twig: The fine section of twig was directly cut with the help of sharp blade and the sections were stained with saffranine solution (1% solution of saffranine in 50% alcohol w/v). The sections were mounted on glass slides in 50% (v/v) glycerine and covered with cover slip. All samples were examined under the microscope and photographs were taken.

(d) Histochemical analysis: It deals with localization of chemical compounds within the cells by means of specific colors of the compounds. The sections of stem bark, leaf, twig were treated with various stains such as ferric chloride solution (10%), sudan-III, conc. HCl, conc. H₂SO₄, pinch of phloroglucinol + conc. HCl and saturated solution of sudan IV in 70% alcohol and the compounds present in the cells were identified with the help of microscope through the colors, which are specific to the compounds when stained with specific dyes.

2.1.5 Powder study

2.1.5.1 Microscopy: The powders of stem bark, leaf, and twig were examined for its microscopic characters. The powders were passed through sieve no. 60 and treated with chloral

hydrate to remove colouring matter and viewed under microscope at the 10X eye piece and 40X objective for stone cells, calcium oxalate crystals and other characters.

2.1.5.2 Fluorescence analysis: (Kokate C. K.1991, and Khandelwal K. R. 2001),

The powder was subjected to fluorescence analysis for the detection of the presence of compounds, which are fluorescent in nature. Many substances when suitably illuminated, emit light of different wavelengths or colour from that what falls on them. Fluorescence of powders of stem bark, leaf, flower and twig were observed in day light and in UV light (254 nm & 366 nm). The powdered drugs were treated with different solvents in the glass slides. The solvents used were 1N HCl (aqueous), 1N HNO₃ (aqueous), 1N H₂SO₄ (aqueous), CH₃COOH, 1N NaOH (aqueous), Aq. NaOH, Meth. NaOH, I₂, 1N KOH, Aq. KOH, Meth. KOH, alcohol as such, acidic alcohol and basic alcohol.

2.1.5.3 Organoleptic study: It included determination of color, odor and taste.

2.2 Physiochemical standardization: (According to Ayurvedic pharmacopoeia of India)

2.2.1 Determination of Moisture Content (Loss on Drying)

An excess of water in medicinal plant materials will encourage microbial growth, the presence of fungi or insects, and deterioration following hydrolysis. Limits for water content should therefore be set for every given plant material. This is especially important for materials that absorb moisture easily or deteriorate quickly in the presence of water.

2.2.2 Determination of total ash value: The residue remaining after incineration is the ash content of the drug, which simply represents inorganic salts, naturally occurring in drug or adhering to it or deliberately added to it as a form of adulteration. Many a time, the crude drugs are admixed with various mineral substances like sand, soil, calcium oxalate, chalk powder or other drugs with different inorganic contents. For determination of total ash, the powdered drug is incinerated so as to burn out all organic matter. Ash value is a criterion to judge the identity or purity of crude drugs. Total ash usually consists of carbonates, phosphates, silicates and silica.

2.2.3 Determination of total acid insoluble ash value: (Ayurvedic Pharmacopoeia of India 1989) Acid- insoluble ash which is a part total ash insoluble in diluted hydrochloric acid is also recommended for natural drugs. Adhering dirt and sand may be determined by acid-insoluble ash contain.

2.2.4 Determination of extractive values: Extractive value is a measure of the content of the drug extracted by solvents. Extractive value can be water soluble and alcohol soluble.

2.2.5 Determination of total sugars: (Montgomery R. 1957), Estimation of total Sugar in plant material was carried out according to (Mont Gomery, 1957) [Spectrophotometric method]

Table 1: Preparation of calibration curve for sugar content. (Std. used D-Glucose)

S. no.	Amount from stock (ml)	80% phenol solution (ml)	Conc. sulphuric acid (ml)	Dist. Water (ml)Up to	Conc. (mg/ml)	Abso. At 490 nm
1	0.1	0.1	5	10	0.001	0.218
2	0.2	0.1	5	10	0.002	0.238
3	0.3	0.1	5	10	0.003	0.281
4	0.4	0.1	5	10	0.004	0.322
5	0.5	0.1	5	10	0.005	0.345
6	Blank	0.1	5	10		

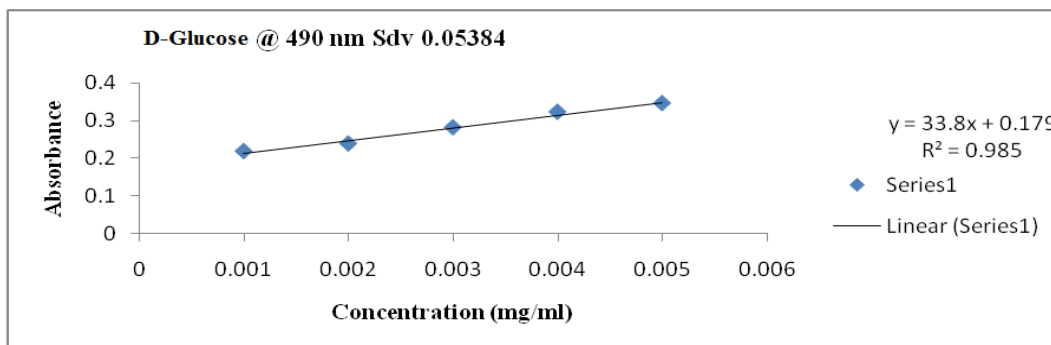


Fig 1: Calibration curve

2.2.6 Determination of total starch: (Montgomery R. 1957) according to (Mont Gomery, 1957) ^[55] [Spectrophotometric method] ^[55], Estimation of total Starch in plant material was carried out

Table 2: Preparation of calibration curve for starch content. (Std. used as soluble starch)

S. no.	Amount from stock (ml)	80% phenol solution (ml)	Conc. sulphuric acid (ml)	Dist. Water (ml) up to	Conc. (mg/ml)	Abso. At 490 nm
1	0.1	0.1	5	10	0.001	0.185
2	0.2	0.1	5	10	0.002	0.197
3	0.3	0.1	5	10	0.003	0.209
4	0.4	0.1	5	10	0.004	0.211
5	0.5	0.1	5	10	0.005	0.241
6	Blank	0.1	5	10		

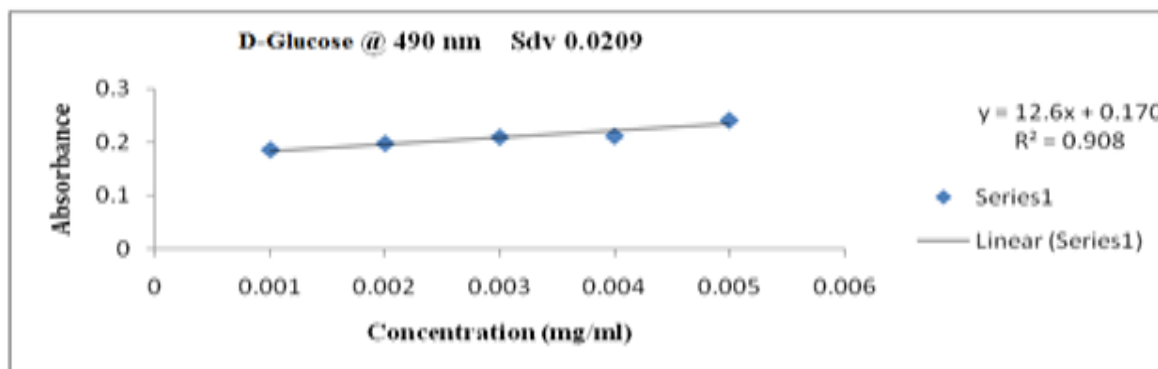


Fig 2: Calibration curve

2.2.7 Determination of total tannins: (Anonymous 1984) carried out according to the method described in AOAC (Anonymous, 1984). Estimation of tannin percentage in the plant material was

Table 3: Preparation of calibration curve for tannin content (Std. used as Tannic acid)

S. no.	Amount from stock (ml)	Folin-ciocalteu's phenol reagent(ml)	Saturated sodium carbonate solution (ml)	Distilled water(ml) Upto	Conc. (mg/ml)	Abso At 760 nm
1	1	5	10	100	0.001	0.152
2	2	5	10	100	0.002	0.238
3	3	5	10	100	0.003	0.332
4	4	5	10	100	0.004	0.444
5	5	5	10	100	0.005	0.531
6	Blank	5	10	100		

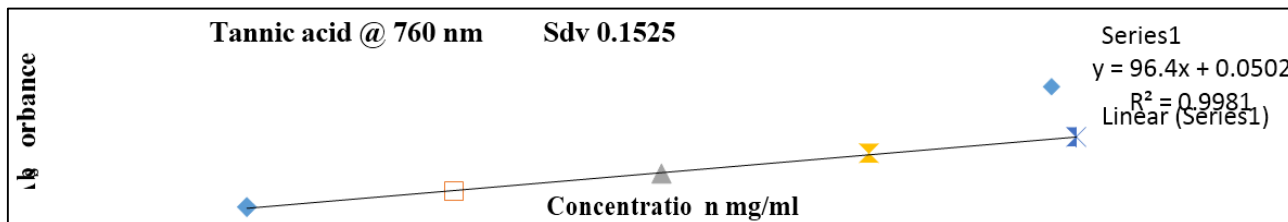


Fig 3: Calibration curve

2.2.8 Determination of total phenolics: (Bray H. C. and Thorpe W. V. 1954) Total phenols estimation can be carried out with Folin-Ciocalteu reagent (FCR).

Table 4: Preparation of calibration curve for phenolic content

S. No.	Amount from stock (ml)	Dist. Water (ml)	Folin- ciocalteu’s phenol reagent(ml)	20% sodium carbonate solution (ml)	Dist. Water (ml) Up to	Conc. (mg/ml)	Abso. At 765 nm
1	0.2	10	1.5	4	25	0.0008	0.139
2	0.4	10	1.5	4	25	0.0016	0.264
3	0.6	10	1.5	4	25	0.0024	0.369
4	0.8	10	1.5	4	25	0.0032	0.467
5	1	10	1.5	4	25	0.0040	0.565
6	Blank	10	1.5	4	25		

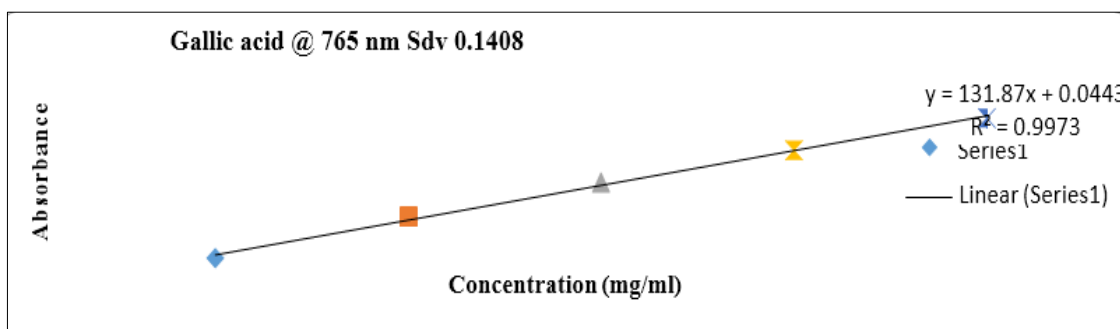


Fig.4: Calibration curve for phenolic content

2.2.9. Determination of total flavonoids: (Ez Ordon L. A. A. *et al.*, 2006) Total flavonoids were estimated using the method of Ordon *et al.*, [2006],used to estimate total flavonoid contents of the extract solution based on the formation of a complex flavonoid-aluminium.

Table 5: Preparation of calibration curve for flavonoid content

S. no.	Amount from stoke (ml)	2% aluminum chloride solution(ml)	Dist. Water (ml) up to	Conc. (mg/ml)	Abso. At 420 nm
1	0.2	0.5	10	0.002	0.401
2	0.4	0.5	10	0.004	0.739
3	0.6	0.5	10	0.006	1.065
4	0.8	0.5	10	0.008	1.354
5	1	0.5	10	0.010	1.745
6	Blank	0.5	10		

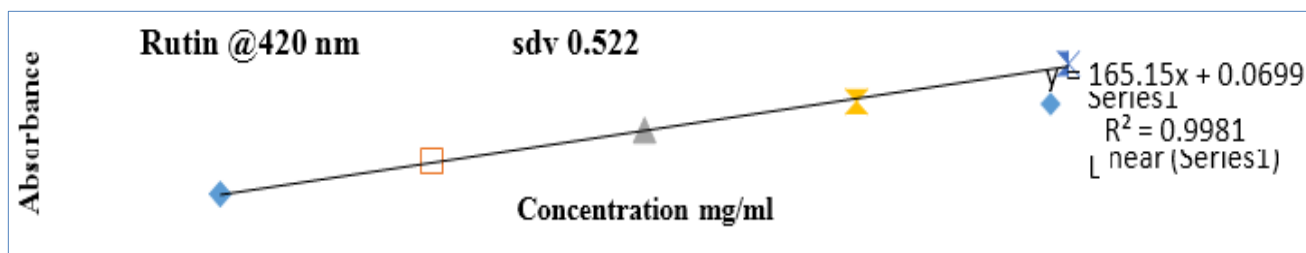


Fig 5: Calibration curve

3. Chromatographic Analysis

3.1 HPTLC analysis

It was done by using 3 different reference standards namely, β -sitosterol, stigmasterol and ursolic acid. β -sitosterol, stigmasterol and ursolic acid were applied on one precoated

silica gel G60 F254 Merck glass plate.

The HPTLC technique in standardization is required for -

- Quantification of marker components by area under curve
- Determination of the accurate RF values for the marker

- components
- Determination of the purity of the substance (peak purity)
- Determination of the absorption maxima of the substance

4. Result
4.1 Macroscopy

Table 6

Size	1.2-2.5 cm length and 0.25 cm in breadth	1.8-2.5 cm length and 0.3 cm in breadth
Shape	Oblong	Oblong
Apex	Blunt,	Blunt,
Surface	Glabrous	Glabrous
Leaflet	10-12 pairs, subsessile	15-18 pairs, petiolate
Type	Bipinnately compound	Bipinnately compound
Venation	Reticulate	Reticulate
Stipule	Stipular spines are variable	Stipular spines are variable
Margin	Entire	Entire
Base	Round	Round
Arrangement	Alternate	Alternate

4.2 Microscopy

Thick and straight walled epidermal cells, large mucilage cavities in the mesophyll tissue and paracytic type stomata, prismatic type of calcium oxalate crystals in the mesophyll tissue, dense deposition of tannin content, The mesophyll has a palisade cell and spongy mesophyll tissue has three or four

layers of loosely arranged parenchyma cells. The vascular bundle is collateral with a conical mass of thick-walled, angular xylem elements and a thin arc of phloem elements; A thick arc of gelatinous sclerenchymatous cells occurs on both upper and lower sides of the bundle.

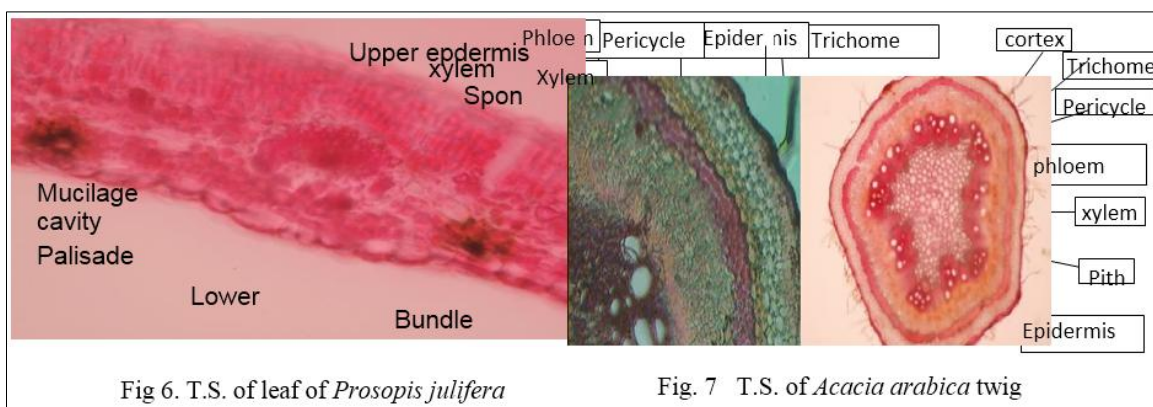


Table 7: Microscopy of Bark

	<i>Acacia Arabica (Bark)</i>	<i>Prosopis julifera (Bark)</i>
Cork	15-25 layered, thin-walled, slightly flattened mostly rectangular, brown coloured cork cells, A few lenticels formed by rupturing of cork cells, secondary cortical cells ovate to elongated, many tanniferous stone cells, variable in shape and size present in large groups.	10-15 layered, thin-walled, rectangular brown cork cells. A few lenticels formed by rupturing of cork cells, tannin cell present and fibers also present in cortex.
Cortex	phloem consists of sieve tubes, companion cells, fibres, crystal fibres and phloem parenchyma, phloem tissues filled with reddish or brown contents present, crystal fibres thick-walled, elongated, divided by transverse septa into segments, each contain a prismatic crystal of calcium oxalate, medullary rays uni to-multi- seriate, crystals of calcium oxalate found scattered amongst the stone cell"cells of secondary cortex and phloem parenchyma.	Phloem consists of sieve tubes, companion cells, fibres, and phloem parenchyma, medullary rays uni to multiseriate. Gum resin duct present in phloem.
Phloem		



Fig 8: Prosopis julifera bark A, cork cell, B, medullary rays and phloem, C, fiber,

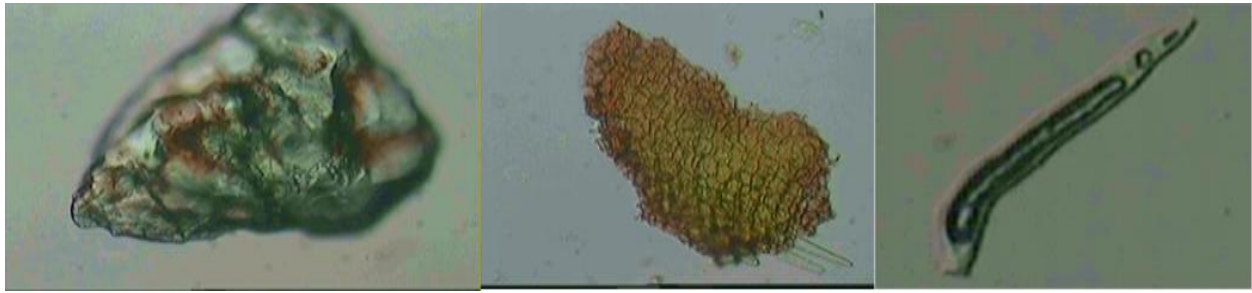


Fig 9: Twig of *Acacia arabica* A, Prismatic calcium oxalate crystal, B, Epidermal cell with fiber, C, Trichome

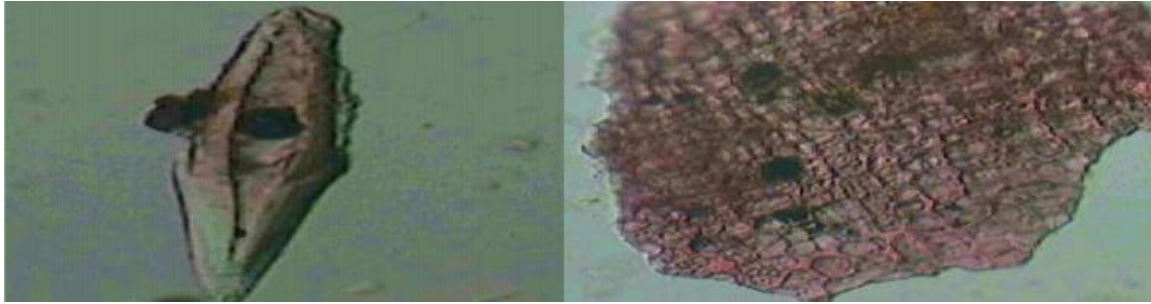


Fig 10: *Prosopis* twig

4.3 Fluorescence analysis

Table 8: Fluorescence analysis in day light

S. No.	Reagent used	<i>A. arabica</i> (leaf)	<i>A. arabica</i> (bark)	<i>A. arabica</i> (twig)	<i>P. julifera</i> (leaf)	<i>P. julifera</i> (bark)	<i>P. julifera</i> (twig)
1.	Powder as such	Dark green	Brown	Yellow	Green	Light Yellow	Light orange
2.	Powder + 1N NaOH in H ₂ O	Redish brown	Black	Yellow	Green	Yellow	Light green
3.	Powder + 1N HCl	green	Brown	Yellow	Green	Brownish yellow	Light green
4.	Powder + 1N H ₂ SO ₄	green	Blackish brown	Yellow	Green	Yellow	Light green
5.	Powder + HNO ₃	Brown	orange	Light orange	Yellowish green	Bright yellow	Orange
6.	Powder + 1N NaOH in MeOH	Black	Black	Dark yellow	Dark green	Dark brown	Light orange
8.	Powder + KOH	brown	Redish brown	Yellow	Light green	Bright yellow	Orange
9.	Powder + H ₂ SO ₄	Dark brown	Redish brown	Black	Blakish green	Black	Black
10.	Powder + GAA	Black green	Brown	Yellow	Green	Yellow	Green
11.	Powder + Methanol	Dark green	Brown	Yellow	Light green	Yellow	Green
12.	Powder + Acetone	Dark Green	Dark brown	Yellow	Light green	Yellow	Yellow
13.	Powder+EtOH	Brown	Black	Yellow	Light green	Yellow	Yellow
14.	Powder+Alc FeCl ₃	green	Dark green	Yellow	Yellowish green	Black	Green

Table 9: Fluorescence analysis in 254 nm.

S. No	Reagent used	<i>A. arabica</i> (leaf)	<i>A. arabica</i> (bark)	<i>A. arabica</i> (Twig)	<i>P. julifera</i> (leaf)	<i>P. Julifera</i> (bark)	<i>P. julifera</i> (twig)
1.	Powder as such	Greenish brown	green	Green	Green	Green	Green
2.	Powder + 1N NaOH in H ₂ O	Dark green	Dark Green	Dark green	Green	Green	Green
3.	Powder + 1N HCl	green	Light Green	Green	Yellow green	Green	Green
4.	Powder + 1N H ₂ SO ₄	Dark green	Black	Green	Yellow green	Green	Green
5.	Powder + HNO ₃	Dark green	Light green	Green	Green	Green	Green
6.	Powder + 1N NaOH in MeOH	Dark green	Black	Green	Green	Green	Dark green
8.	Powder + KOH	Black	green	Green	Yellow green	Green	Green
9.	Powder + H ₂ SO ₄	Dark green	Black	Dark green	Dark green	Blackish h green	BlackishGreen
10.	Powder + GAA	Dark green	Green	Green	Green	Green	Green
11.	Powder + Methanol	Brown	Grey	Green	Green	Green	Green
12.	Powder + Acetone	Dark Green	Light Green	Green	Green	Green	Green
13.	Powder+EtOH	Green	Black	Green	Green	Green	Green
14.	Powder + Alc FeCl ₃	Dark green	Dark green	Green	Green	Dark green	Bright green

Table 10: Fluorescence analysis in 365 nm.

S. No	Reagent used	<i>A. arabica</i> (leaf)	<i>A. arabica</i> (bark)	<i>A. arabica</i> (twig)	<i>P. julifera</i> (leaf)	<i>P. julifera</i> (bark)	<i>P. julifera</i> (twig)
1.	Powder as such	Black	Dark black	Black	Blackish green	Black	Black
2.	Powder + 1N NaOH in H ₂ O	Black	black	Black	Blackish green	Black	Black
3.	Powder + 1N HCl	Black	Dark black	Black	Blackish green	Black	Black
4.	Powder + 1N H ₂ SO ₄	Black	Black	Black	Blackish green	Black	Black
5.	Powder + HNO ₃	Dark black	Dark black	Black	Blackish green	Black	Black
6.	Powder + 1N NaOH in MeOH	Dark black	Dark black	Black	Blackish green	Black	Black
8.	Powder + KOH	Black	Dark black	Black	Blackish green	Black	Black
9.	Powder + H ₂ SO ₄	Black	Black	Black	Blackish green	Black	Black
10.	Powder + GAA	Black	Dark black	Black	Blackish green	Black	Black
11.	Powder + Methanol	Black	Black	Black	Blackish green	Black	Black
12.	Powder + Acetone	Dark black	Black	Black	Black green	Black	Black
13.	Powder + EtOH	Black	Black	Black	Blackish green	Black	Black
14.	Powder + Alc FeCl ₃	Black	Black	Dark Black	Blackish green	Black	Dark Black

4.4 Physicochemical analysis

Table 11: Moisture content

Observation	<i>Acacia arabica</i> (Leaves)	<i>Acacia arabica</i> (Bark)	<i>Acacia arabica</i> (Twig)	<i>Prosopis julifera</i> (Leaf)	<i>Prosopis julifera</i> (Bark)	<i>Prosopis julifera</i> (Twig)
Range (%)	3.90-4.2%	4.90-5.40%	5.2-5.7%	4.6-4.1%	4.2-4.5%	5.5-5.3%
Average (%)	3.95%	5.20%	5.45%	4.75%	4.35%	5.4%

Table 12: Ash value

Species and parts	Total ash (%)	Average (%)	Acid insoluble ash (%)	Average (%)	Water soluble ash (%)	Average (%)
<i>A.arabica</i> (leaf)	9.25-9.55	9.4	1.13-1.25	1.21	0.855-0.895	0.870
<i>A.arabica</i> (bark)	8.00-8.10	8.05	1.19-1.045	1.033	0.842-0.888	0.865
<i>A.arabica</i> (twig)	7.5-7.9	7.75	0.999-1.35	1.0746	0.865-0.840	0.852
<i>P.julifera</i> (leaf)	8.00-8.20	8.1	1.26-1.55	1.41	0.752-0.782	0.767
<i>P.julifera</i> (bark)	8.20-8.30	8.25	1.02-1.15	1.085	0.768-0.807	0.787
<i>P.julifera</i> (twig)	8.35-8.40	8.4	0.930-1.10	1.037	0.812-0.853	0.832

Table 13: Total phenolic content

Species and parts	phenolic content (%)	Average (%)
<i>A.arabica</i> (leaf)	0.0405-0.0406	0.04055
<i>A.arabica</i> (bark)	0.0400-0.0402	0.0401
<i>A.arabica</i> (twig)	0.0328-0.0348	0.0338
<i>P.julifera</i> (leaf)	0.0406-0.0408	0.047
<i>P.julifera</i> (bark)	0.825-0.00851	0.00838
<i>P.julifera</i> (twig)	0.0138-0.140	0.01392

Table 14: Total tannin content

Species and parts	Tannin content (%)	Average (%)
<i>A.arabica</i> (leaf)	10.25-10.35	10.30
<i>A.arabica</i> (bark)	20.25-20.32	20.28
<i>A.arabica</i> (twig)	22.42-22.53	22.47
<i>P.julifera</i> (leaf)	5.38-5.40	5.39
<i>P.julifera</i> (bark)	10.65-10.88	10.774
<i>P.julifera</i> (twig)	15.49-15.62	15.51

Table 15: Total Flavonoid content

Species and parts	Flavonoid content (%)	Average (%)
<i>A.arabica</i> (leaf)	0.1822-0.1842	0.1832
<i>A.arabica</i> (bark)	0.0220-0.0235	0.02275
<i>A.arabica</i> (twig)	0.030-0.0340	0.0270
<i>P.julifera</i> (leaf)	0.2412-0.2436	0.2424
<i>P.julifera</i> (bark)	0.05336-0.05454	0.05390
<i>P.julifera</i> (twig)	0.00672-0.00680	0.00675

Table 16: Total starch content

Species and parts	Starch content (%)	Average (%)
<i>A.arabica(leaf)</i>	3.68-3.96	3.75
<i>A.arabica(bark)</i>	4.14-4.46	4.30
<i>A.arabica(twig)</i>	9.9-10.65	10.34
<i>P.julifera(leaf)</i>	4.14-4.34	4.24
<i>P.julifera(bark)</i>	4.8-5.2	5.0
<i>P.julifera(twig)</i>	5.25-5.45	5.35

Table 17: Total Sugar content

Species and parts	Suger content (%)	Average (%)
<i>A.arabica(leaf)</i>	6.17-6.95	6.56
<i>A.arabica(bark)</i>	2.24-2.62	5.65
<i>A.arabica(twig)</i>	2.10-2.18	2.14
<i>P.julifera(leaf)</i>	11.45-11.71	11.58
<i>P.julifera(bark)</i>	11.17-11.99	11.68
<i>P.julifera(twig)</i>	8.2-9.0	8.6

4.5 Phytochemical analysis

Table 18: Extractive value

Species and parts	Hexane soluble (%)	Average (%)	Alcohol soluble (%)	Average (%)	Water soluble (%)	Average (%)
<i>A. Arabica(leaf)</i>	5.9-6.1	6	10.66-11.00	10.83	11.13-11.44	11.33
<i>A. arabica (bark)</i>	4.14-4.3	4.2	15.51-15.83	15.55	8.98-9.35	9.165
<i>A. arabica (Twig)</i>	1.06-1.22	11.4	2.64-3.10	2.87	6.02-6.36	6.19
<i>P. julifera (leaf)</i>	6.38-6.66	6.57	11.85-12.15	12.0	18.26-18.56	18.416
<i>P. julifera (bak)</i>	1.53-1.86	1.645	17.83-18.16	17.33	15.10-15.23	15.165
<i>P. julifera (Twig)</i>	1.16-1.16	1.16	5.5-5.8	5.66	6.8-7.2	7.0

Table 19: Successive solvent extractive value

Species and parts	Hexane (% extractive)	Chloroform (% extractive)	Acetone (% extractive)		
<i>A. arabica (leaf)</i>	4.19	6.5	7.2		
<i>A. arabica (bark)</i>	0.40	1.9	7.18	8.34	8.36
<i>A. arabica (Twig)</i>	1.82	1.83	9.8	9.9	9.2
<i>P. julifera (leaf)</i>	4.23	3.95	2.98	5.73	6.13
<i>P. julifera (bark)</i>	0.9	2.28	6.1	10.5	8.3
<i>P. julifera (twig)</i>	3.16	1.36	3.2	2.3	8.5

Table 20: Qualitative chemical tests of hexene extracts

Test	<i>A. arabica (leaf)</i>	<i>A. arabica (bark)</i>	<i>A. arabica (Twig)</i>	<i>P. julifera (leaf)</i>	<i>P. julifera (bark)</i>	<i>P. julifera (twig)</i>
Steroids	+	+	+	+	+	+
Triterpenoids	+	+	+	+	+	+
Saponin	--	--	--	--	--	--
Flavonoids	--	--	--	--	--	--
Tannin	--	--	--	--	--	--
Resin	--	--	--	--	--	--
Alkaloids	--	--	--	--	--	--
Glycosides	--	--	--	--	--	--
Carbohydrate	--	--	--	--	--	--
Reducing sugar	--	--	--	--	--	--
Protein & amino acids	--	--	--	--	--	--

+ Present, - Absent

Table 21: Qualitative chemical tests of Acetone extracts

Test	<i>A. arabica (leaf)</i>	<i>A. arabica (bark)</i>	<i>A. arabica (Twig)</i>	<i>P. julifera (leaf)</i>	<i>P. julifera (bark)</i>	<i>P. julifera (twig)</i>
Steroids	--	-	--	-	+	+
Triterpenoids	--	-	--	+	+	+
Saponin	--	--	--	--	--	--
Flavonoids	--	--	--	--	-	-
Tannin	+	+	+	+	+	+
Resin	--	--	-	-	-	-
Alkaloids	-	-	-	-	-	-
Glycosides	--	-	-	-	-	--
Carbohydrate	--	-	-	-	-	-
Reducing sugar	-	-	-	-	--	--
Fixed oils & fats						
Protein & amino acids	--	--	--	-	-	--

Table 22: Qualitative chemical tests of ethanolic extracts

Test	<i>A. arabica</i> (leaf)	<i>A. arabica</i> (bark)	<i>A. arabica</i> (Twig)	<i>P. julifera</i> (leaf)	<i>P. julifera</i> (bark)	<i>P. julifera</i> (twig)
Steroids	--	--	--	--	--	--
Triterpenoids	--	--	--	--	-	-
Saponin	--	-	-	-	--	--
Flavonoids	+	+	+	+	+	+
Tannin	+	+	+	+	+	+
Resin	--	--	--	--	--	--
Alkaloids	--	--	--	--	--	--
Glycosides	--	--	--	--	--	-
Carbohydrate	+	--	--	+	--	--
Starch	--	--	--	--	--	--
Protein & amino acids	--	--	--	--	--	--

Table 23: Qualitative chemical tests of water extracts

Test	<i>A. arabica</i> (leaf)	<i>A. arabica</i> (bark)	<i>A. arabica</i> (Twig)	<i>P. julifera</i> (leaf)	<i>P. julifera</i> (bark)	<i>P. julifera</i> (twig)
Steroids	--	--	--	--	--	--
Triterpenoids	--	--	--	--	--	--
Saponin	--	--	--	--	--	--
Flavonoids	--	--	--	--	--	--
Tannin	+	+	+	+	+	+
Resin	--	--	--	--	--	--
Alkloids	--	--	--	--	--	--
Glycosides	--	--	--	--	--	--
Carbohydrate	+	+	+	--	+	+
Sugar	+	+	+	+	+	+
Protein & amino acids	--	--	--	--	--	--

4.6 HPTLC Analysis

Table 24: Qualitative analysis

Species and parts	β -sitosterol	Stigmasterol	Ursolic acid
<i>A. arabica</i> (leaf)	+		-
<i>A. arabica</i> (bark)		+	-
<i>A. arabica</i> (twig)		+	-
<i>P. julifera</i> (leaf)	+		-
<i>P. julifera</i> (bark)		+	-
<i>P. julifera</i> (twig)			+

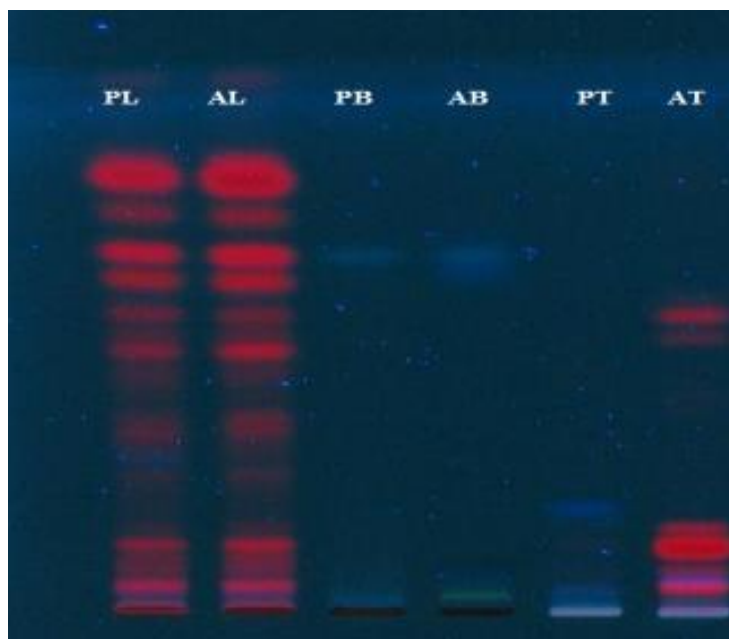


Fig. 11. HPTLC plate of Prosopis and Acacia at 366 nm

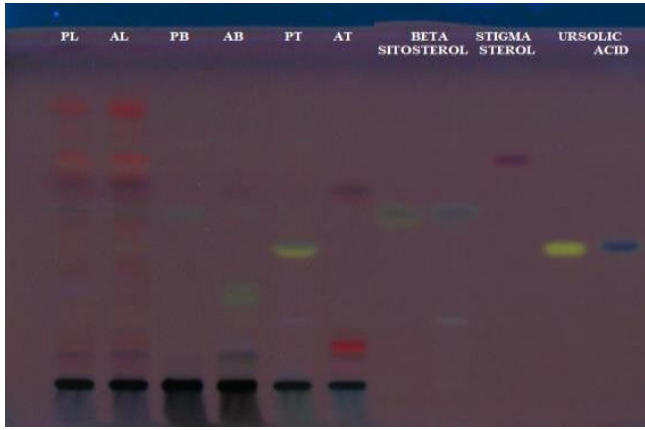


Fig 12: HPTLC Plate of Prosopis and Acacia at 254 nm.

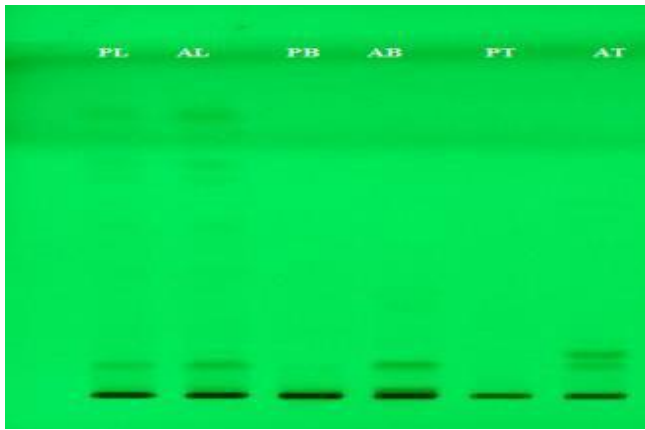


Fig 13: HPTLC Plate Prosopis and Acacia

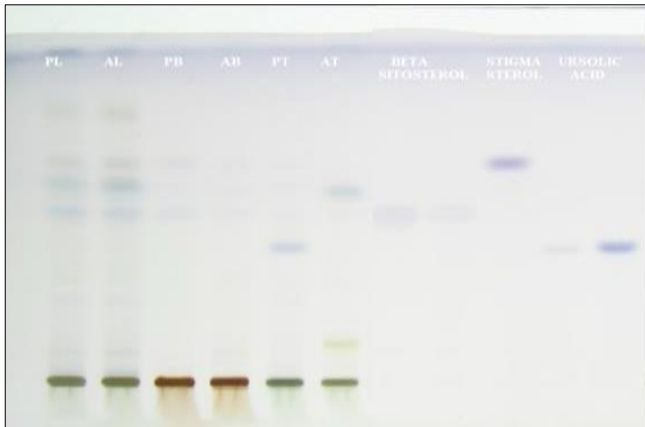


Fig 14: HPTLC Plate at Visible Light.

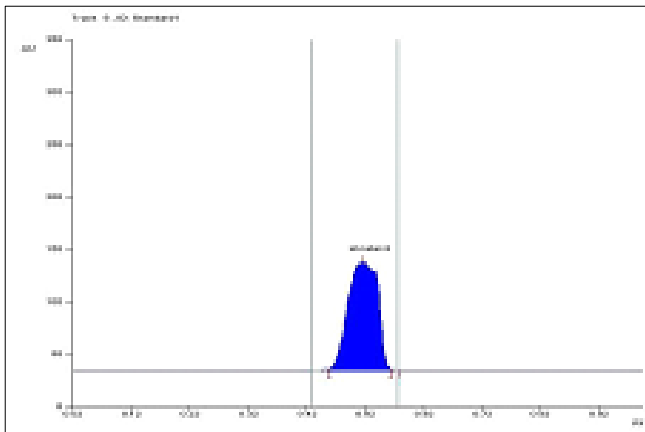


Fig 15: Chromatogram of standard β -sitosterol

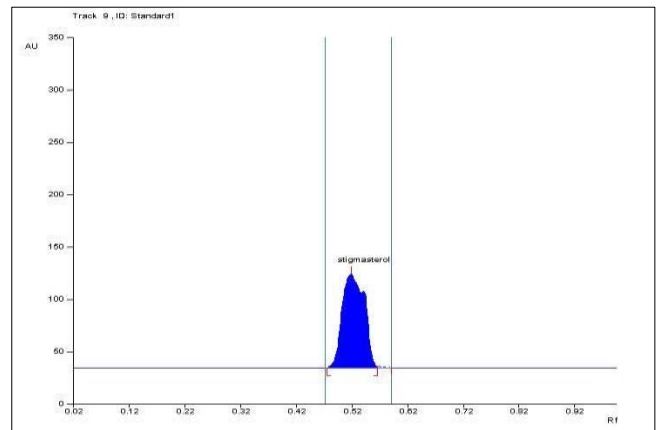


Fig 16: Chromatogram of standard of stigmasterol

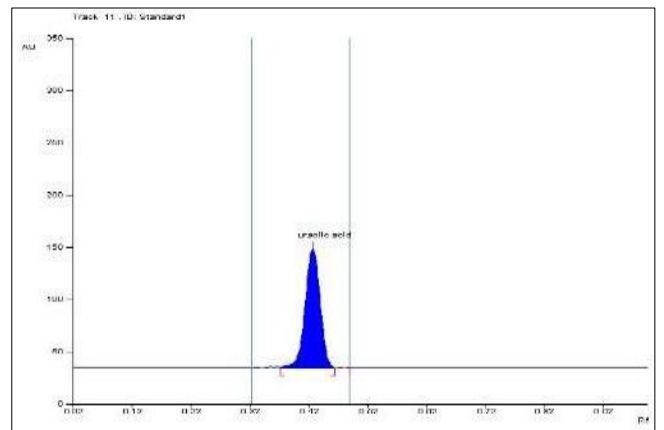


Fig 17: Chromatogram of standard ursolic acid

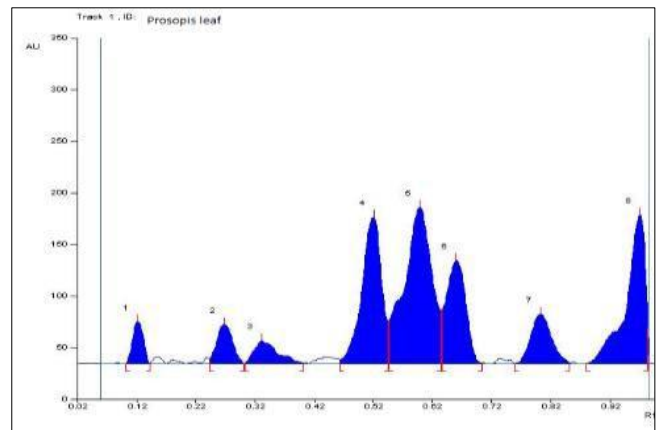


Fig 18: Chromatographic profile of *Prosopis* leaf

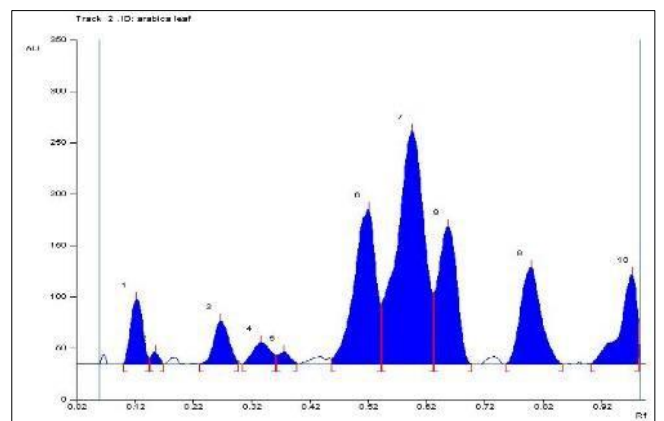


Fig 19: Chromatographic profile of *Acacia arabica* leaf

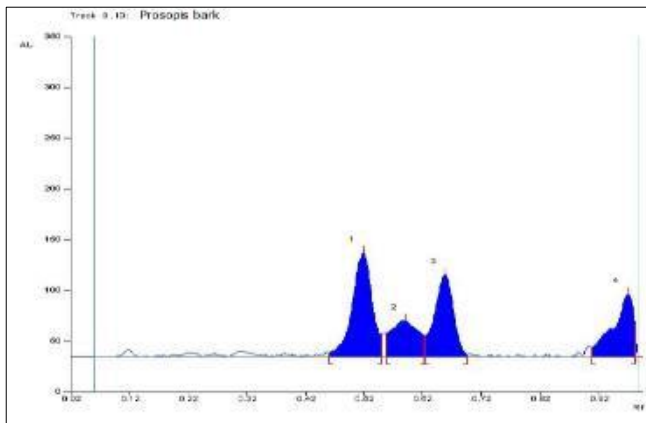


Fig 20: Chromatographic profile of *Prosopis* bark

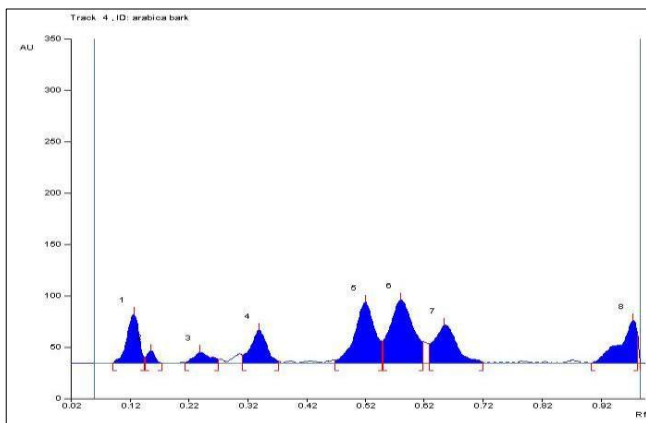


Fig 21: Chromatographic profile of *Acacia* bark

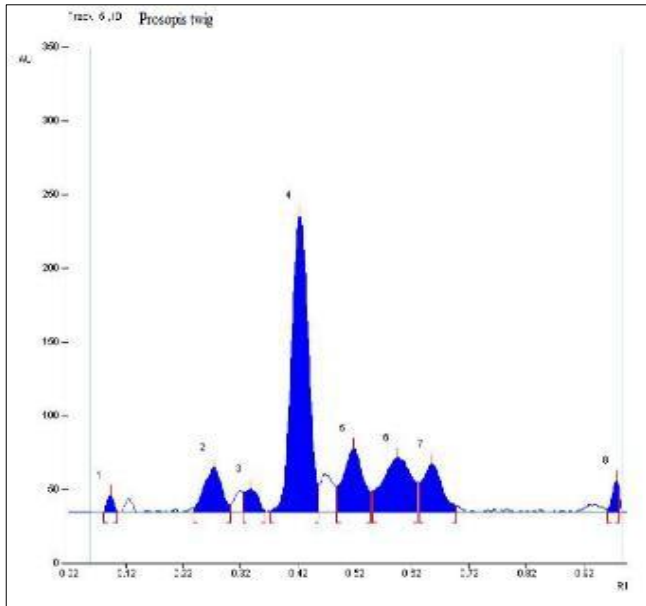


Fig 22: Chromatographic profile of *Prosopis* twig

Table 25: Absorbance at various concentrations

Concentration	0.02	0.04	0.06	0.08	0.1
Ascorbic acid	0.153	0.133	0.114	0.099	0.116
Quercitin	0.217	0.182	0.202	0.211	0.168
Acacia leaf	0.130	0.140	0.131	0.127	0.128
Acacia bark	0.182	0.180	0.176	0.170	0.162
Acacia twig	0.150	0.158	0.153	0.148	0.162
Prosopis leaf	0.192	0.191	0.190	0.194	0.201
Prosopis bark	0.161	0.176	0.160	0.172	0.170
Prosopis twig	0.182	0.186	0.196	0.176	0.172

5. Discussion

Botanical study is of prime importance in establishing quality control (identification) of herbal drugs. It may also provide a suitable criteria to differentiate the different parts used of *Acacia Arabica* and *Prosopis julifera* (Sw.)DC. Detailed study of macroscopical, microscopical and powder microscopy and organoleptic study of powdered drug was done of stem bark, leaf, and twig microscopy. The results of histochemical analysis showed that tannins were present in all the parts of the *Acacia arabica* and *Prosopis julifera*(Sw.)DC. Calcium oxalate crystals are more common among diversified plant group. They exhibit the unique properties of pleomorphism and birefringence and were present in stem bark, twigs. Absence of cutin and suberin shows the absence of phloem cells in all the sections. All parts of all the sections stained black when treated with ferric chloride 10% which shows the presence of tannins. Stone cell present in twig of both species. Ash content followed by stem bark and twig. But in *Prosopis julifera* twig contain maximum percentage followed by stem bark and twig. Leaf of *Acacia arabica* has maximum percentage of Ash content. Leaf of *Acacia arabica* and *Prosopis julifera* have maximum water soluble Ash content followed by Bark and twig. Twig of *Prosopis julifera* has maximum acid insoluble ash content followed by stem bark and twig. While leaf of *Acacia arabica* has maximum acid insoluble ash content followed by stem bark and twig. The results of total extractive values shows that twig of *Acacia arabica* contain large percentage of hexene soluble extract followed by leaf and bark while leaf of *Prosopis julifera* has maximum followed by bark and twig, maximum percentage in *Prosopis julifera* leaf and minimum twig. But in ethanol both stem bark have maximum content followed by leaf and twig, *Prosopis julifera* stem bark has maximum ethanol extract content and minimum in twig. But in water soluble extract, leaf contains more percentage of extract followed by stem bark, and twig. According to the results *Acacia* leaf contain the highest amount of phenols followed by stem bark and twig, and *Prosopis* leaf also contain highest amount followed by twig and bark. *Prosopis* leaf has maximum percentage and bark contain lowest amount. The level of flavonoids in the methanolic extract of the various parts. Total flavonoid content was much higher in the leaf followed by stem bark, and twig. Leaf of *Prosopis julifera* contain maximum amount of flavonoid and twig contain minimum.

Conclusion

It is concluded that given plant is *Acacia arabica* and *Prosopis julifera*, I have done the comparative pharmacognostical study between *Acacia arabica* and *Prosopis julifera* and conclude that *Acacia arabica* plays more significant role and has more scientific value. The present study was aimed at pharmacognostical study. Plants *Acacia Arabica* and *Prosopis julifera* were studied for pharmacognostical characteristic, namely, morphology, microscopy, physicochemical, parameters which can be of utilized in identification and Authentication of plants. Successive, extractive and phytochemical screening revealed the present of Tannin Alkaloids, steroids and Terpenoids in various extracts however most of the medicinally potential phytoconstituents where present in alcoholic and aqueous extracts, Methnolic extracts used for the HPTLC analysis. Several medicinal properties have been scientifically established by various worker.

6. References

1. Agrawal SS, Paridhavi M. Herbal drug technology; Universities press (India) private limited, 2007, 1-5.
2. Ahmad Viqar Uddin, Azra Sultana. A terpenoid diketone from the leaves of *Prosopis julifera* HEJ research institute of chemistry, phytochemistry. 1989; 28:278-279.
3. Ajay Kumar Meena, Parveen Bansal, Sanjiv Kumar. Plants-herbal wealth as a potential source of ayurvedic drugs / Asian Journal of Traditional Medicines. 2009; 4:4.
4. Alejandro Tapia *et al.* Biologically active alkaloids and a free radical scavenger from *Prosopis* species, journal of ethnopharmacology. 2006; 71:241-246.
5. Aqeel Ahmad *et al.* Immunomodulating effect of juliflorine on the antibody response to listeria hemolysin, journal of islamic academy of sciences. 1992; 5(3):189-193.
6. Anonymous. Official Methods of Analysis of Association of official Analytical Chemists (AOAC), Virginia, US, 1984.
7. Rajendran A *et al.* Phytochemical studies and pharmacological investigations on the flowers of *Acacia arabica* African Journal of Pure and Applied Chemistry. 2010; 4(10):240-242.
8. Badreldin H Ali *et al.* Food and toxicology Departments of Pharmacology and Clinical Pharmacy, 2008.
9. Basic Tests for Drugs, Pharmaceutical Substances, Medicinal Plant Materials and Dosage Forms. World Health Organization, Geneva, 1998.
10. Bhushan Patwardhan, Ashok DB, Vaidya. Ayurveda and natural products drug discovery, current science, 2004, 86(6):789-791.
11. Bodekar G *et al.* Global Atlas of Traditional, Complementary and Alternative Medicine. set. contains text and maps. World Health Organization, Geneva, 2005, 1.
12. Botanical.com. A modern herbal by Mrs. M. Grieve.
13. Bray HC, Thorpe WV. Analysis of Phenolic compounds of interest in metabolism, Meth. Biochem. Analysis. 1954; 1:27-52.
14. British Herbal Pharmacopoeia, British Herbal Medicine Association, 1996.
15. Bukhtiar H Shah *et al.* The antiplatelet aggregatory activity of *Acacia nilotica* is due to blockade of calcium influx through membrane calcium channels, General Pharmacology. 1997; 29(2):251-255.
16. Burkart A. A monograph of the genus *Prosopis Leguminosae subfam. Mimosoideae*. J Arn. Arb. 1976; 57(3):450-525.
17. Calixto JB. Efficacy, safety, quality control, marketing and regulatory guidelines for herbal medicines (phytotherapeutic agents), Braz. J Med Biol Res. 2000; 33(2):179-189.
18. Calixto JB, Braz. J Med. Biol. Res. 2000, 33, 179.
19. Dinesh Kumar C. Pharmacognosy can help minimize accidental misuse of herbal medicine Current Science. 2007; 93(10):25.
20. Clark DT. The effects of *Acacia arabica* gum on the in vitro growth and protease activities of periodontopathic bacteria. J Clin Periodontol. 1993; 20(4):238-43.
21. Clement BA, Goff CM. Forbes TDA. Toxic Amines and Alkaloids from *Acacia rigidula*, Phytochem. 1998; 49(5):1377.
22. Chauhan Malti, Pillai APG. Microscopic profile of powdered drugs used in Indian System of Medicine, Institute of Ayurvedic Medicinal Plant Sciences, Gujarat Ayurved University, Gujarat, India, 2005.
23. De Smet. PAGM, Drug Inf. J. 1999, 33, 717.
24. De Smet, PAGM. Health Risks of Herbal Remedies Drug Safety. 1995, 13:81.
25. Dr. Duke's Phytochemical and Ethnobotanical Databases.
26. Elfranco Malan. Derivatives of (+)-catechin-5-gallate from the bark of *Acacia nilotica* Phytochemistry. 1991; 30(8):2737-2739.
27. Eskinazi DP. Factors That Shape Alternative Medicine, JAMA. 1998; 280(18):1.
28. Ez Ordon LAA, *et al.* Antioxidant activities of *Sechium edule* (Jacq.) Swart extracts. 2006; 97:452-458621-1623.
29. General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine. World Health Organization, Geneva, 2002.
30. George Smith, Herbs in medicine Triple Helix Autumn, 4, 12.
31. Goldman P. Herbal Medicines Today and the Roots of Modern Pharmacology. 2001; 135:594-600.
32. Guidelines for the Assessment of Herbal Medicines. WHO Technical Report Series, No 863. World Health Organization, Geneva, 1996.
33. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products, EMEA/CVMP/81400 Review. European Agency for the Evaluation of Medicinal Products, London, 2005.
34. Harborne JB. Phytochemical methods-a guide to modern techniques of plant analysis, Springer, 1998.
35. Hiroshi Nakano *et al.* Structure-activity relationships of alkaloids from mesquite (*Prosopis juliflora* (Sw.) DC.) Biomedical and Life Sciences Plant Growth Regulation. 2009; 3:207-210.
36. Mallik H *et al.* Ionic conduction in photosensitive biocomplex of *Acacia arabica* Solid State Ionics. 2004 175, issue 1-4, pp. 769-772.
37. Hsu CK, Leo *et al.* Arch. Intern. Med. 1995; 155:2245.
38. Inamdar N, *et al.* Herbal drugs in milieu of modern drugs, International journal of green pharmacy, 2008, 2(1). www.greenpharmacy.info
39. Indian Herbal Pharmacopoeia, Indian Drug Manufacturers' Association, Mumbai, 2002.
40. Joanne B. Quality, efficacy and safety of complementary medicines: fashions, facts and the future. Regulation and quality. Br J Clin Pharmacol. 2003; 55(1):226-233.
41. Joshi K, Preeti Chavan. Current Sciences. 2004, 87(2).
42. Kalpana Joshi. Molecular markers in herbal drug technology current science. 2004; 87(2):59-163.
43. Khandelwal KR. Practical Pharmacognosy, Nirali Prakashan, Pune, 2001.
44. Khattoon Sayyada, Mehrotra Shanta, Bark Drugs, NISCAIR, New Delhi, 1st ed. 1-9.
45. Bhutani KK. Finger-Printing of Ayurvedic Drugs, The Eastern Pharmacist, 2000, 21-26.
46. Kokate CK *et al.* Pharmacognosy' 37th edition, Nirali prakashan. 2008; 105-120, 1-3.
47. Kokila A Parmar, *et al.* Anti viral in HEL cell, HeLa cell cultures, antibacterial and antioxidant activity of *Acacia arabica* seeds extracts by the use of DPPH free radical method. J Chem. Pharm. Res. 2010; 2(4):324-332.
48. Kushwaha SKS. Role of Markers in the Standardization of Herbal Drugs: A Review, Archives of Applied Science Research. 2010; 2(1):225-229.

49. Lal Saini Mohan *et al.* Comparative pharmacognostical and antimicrobial studies of acacia species. *Journal of Medicinal Plants Research*. 2008; 2:378-386.
50. Li S, Han Q *et al.* Chemical markers for the quality control of herbal medicines: an overview, *Chinese Medicine*, 2008, 3(7).
51. Loew D, Kaszkin M. Approaching the problem of bioequivalence of herbal medicinal products *Phytotherapy Research*. 2002; 16(8):705-711.
52. Mohamed I Gazi. The finding of antiplaque features in *Acacia Arabica* type of chewing gum *Journal of Clinical Periodontology*. 1991; 18(1):75-77.
53. Monographs on Selected Medicinal Plants. World Health Organization, Geneva, 2002, 2.
54. Monographs on Selected Medicinal Plants, World Health Organization, Geneva, 1999, 1.
55. Montgomery R. Determination of glycogen, *Arch. Biochem. Biophys.* 1957; 67:378-386.
56. MP Raghavendra *et al.* Alkaloid extracts of *Prosopis juliflora* (Sw.) DC. (Mimosaceae) against *Alternaria alternata*. *Journal of Biopesticides*. 2009; 2(1):56-59.
57. Pulok K Mukherjee. Exploring Botanicals in Indian System of Medicine-Regulatory Perspectives. 2003; 20:249-264.
58. Khristova P, Karar I. Soda-anthraquinone pulp from three *Acacia nilotica* subspecies *Bioresource Technology*. 1999; 68(3):209-21.
59. Quality control methods for medicinal plant materials. World Health Organization, Geneva, 1992. WHO/PHARM/92.559/rev.1
60. Quality Assurance of Pharmaceuticals: A Compendium of Guidelines and Related Materials, Good Manufacturing Practices and Inspection. World Health Organization, Geneva, 1996, 2.
61. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
62. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. ISO 9000; Quality Systems Handbook, Fourth Edition, 2001.
63. Raina MK. Quality control of herbal and herbo-mineral formulations. *Indian J Nat Prod*. 2003; 19(1):11-15.
64. Rajbir Singh *et al.* The umbelliferone - An antioxidant isolated from *Acacia nilotica* *Food Chemistry*. 2010; 120(3):825-830.
65. Recent Trends in Use of Herbal and Other Natural Products Judith P. Kelly, MS; David W. Kaufman, ScD; Katherine Kelley, RPh; Lynn Rosenberg, ScD; Theresa E. Anderson, RN; Allen A. Mitchell, MD *Arch Intern Med*. 2005; 165:281-286.
66. Sundaram R, SK Mitra. The Antioxidant activity of ethyl acetate soluble fraction of *Acacia arabica* bark in rats. *Research paper*. 2007; 39(1):33-38.
67. Saad Mohamed Hussein Ayoub. Algicidal properties of *Acacia* species. 1996; 23:389-390.