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Pharmacognostical and Preliminary Phytochemical investigation on the leaves of *Morus alba* Linn

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Abstract:
A monoecious , occasionally dioecious shrub or moderate sized tree with a fairly cylindrical straight bole up to 3m height and 1.8m in girth, mulberry is grown extensively for leaves used for rearing silk worms. Scientific information on their pharmacognosy, Phytochemistry and pharmacology are very scant. Hence, the current study describes some pharmacognostical and preliminary phytochemical investigations undertaken on the leaves of one of this namely *Morus alba* Linn. The plant leaves were collected for this work at Govt.Agriculture College Othakadai, Madurai, Tamilnadu. The leaves were identified and confirmed by Dr.D.Stephen PhD, Botanist, American College of Arts and Science, and then subjected for morphological,microscopicaland physicochemical analysis. The parameters from the above were recorded with an objective of drawing an attention on those populations as well as a reference for further scientific investigations.
Key words: Phytochemical, Dioecious shrub, Pharmacognosy

Introduction:

A small genus of trees or shrubs distributed in the temperature and sub-tropical regions of the northern hemisphere. Four or five species occur in India.Commonly know as mulberries, a few of the morus speies are valued for their foliage, which constitute the chief feed for mulberry silk worms. Leaves are very variable, ovate or broadly ovate, serrate or crenate-serrate often deeply lobed. Flowers are inconspicuos, greenish, male spikes-lax, flowered, broadly cylindrical or ovoid. Female spikes-ovod, pendunculate.

Fruits are syncarp cosists of many drips enclosed in freshly perianth white to pikish colour. A monoecious , occasionally dioecious shrub or moderate sized tree with a fairly cylindrical straight bole up to 3m height and 1.8m in girth, mulberry is grown extensively for leaves used for rearing silk worms. [1,2,3]

Material and Methods:

The plant leaves were collected for this work at Govt.Agriculture College Othakadai, Madurai, Tamilnadu. The leaves were identified and confirmed by Dr.D.Stephen PhD, Botanist, American College of Arts and Science. The voucher specimen was kept at Dept. of Pharmacognosy, K.M.College of pharmacy.

Macroscopy

Morus alba. Linn is a medium sized decidous tree, back of large tems brown, rough and fissures mostly vertical. Leaves very variable in size and shape, usually 5-7.5 cm long, ovate, obtuse, acute or shortly acuminate, serate or crenate serrate, Stems 30-45 cm long, weak branched. Flowers are Greenish in conspicuous. Fruits are syncarp consisiting of many drupes enclosed in fleshly perianth, ovoid or sub globose up to 5 cm long, white or pinkish white, purple or dark purple to black.[4,5,6]

Microscopy[7,8,9,10]

Microscopy of Leaf

Transverse section

Leaf showed at the midrib region an upper epidermis made up of tublat cells with a thin layer of cuticle.

Midrib portion

The midrib is having a slight projection on the upper side and the lower side is wider it consists of Upper epidermis is composed of tangentially arranged single layer of sub-rectangular cell with smooth cuticle trichomes were unicellular covering trichome. Spongy parenchyma is made up of loosely arranged parenchymatous cells cluster crystals of calcium oxalate in

palisade and spongy tissue.Lower epidermis is made up of tangentially arranged single of subrectangular cells with smooth cuticle.

Powder microscopy[11,12,13]

The powder microscopy was also done and characters which are clearly seen, were recorded. The powder microscopy of the powder the *Morus alba. Linn* was stained with pholoroglucinol and Hcl and mounted on a slide with one drop of glycerin. Then observed under microscope .

Powder analysis

Organoleptic characters

Colour Green, Characteristic odour, Visible Course powder. Many crude drug shows fluorescence when the sample is exposed to ultra violent radiation . In UV lamp (366 nm) Crude drug (*Morus alba*.Linn leave powder). The powder was examined directly under UV lamp by adding different reagents.(Table 1)

Table 1 : Fluorescence analysis of the leaf powder of *Morus alba Linn*

S. No	Reagents	UV Lamp (366 nm)	Visible
1.	Powder	Green	Green
2.	Powder + 1N Sodium hydroxide	Yellowish Green	Green
3.	Powder + 1N alcholic Sodium hydroxide	Yellowish Green	Green
4.	Powder + 1N HCL	Dark Green	Redish brown
5.	Powder + 50% HNO3	Pale Yellowish Green	Brown colour

Quantitative microscopy

The length and width of lignified phloem fibres and trichomes are determined by using quantitative microscopy.

Determination of length and width of trichomes

Trichomes types have been successfully used in the classification of genera and even of species in the recognition of inter-specific hybrids.(Table 2,3,4,5)

Table 2: Determination of length and width of trichomes

S.No	Length of trichomes	Width of trichomes
1.	14	3
2.	11	5
3.	9	4
4.	11	5
5.	8	6
6.	12	5
7.	10	5
8.	15	4
9.	7	6
10.	11	5
11.	13	5
12.	10	4
13.	16	7
14.	9	5
15.	12	4
16.	11	5
17.	13	4
18.	10	5
19.	8	3
20.	15	5

Table 3: Trichomes

Trichomes	Mini-mum	Ave-rage	Maxi-mum
Length µ	102.9	169.05	235.2
Width µ	44.1	102.9	102.9

Leaf constants

Determination of vein islet number

The dimensions of the vein islet number, stomatal number, stomatal index and palisade ratio of *Morus alba*.Linn were also calculated.(Table 6,7,8)

Table 4: Determination of length and width of pholem fibres

S.No	Length of fibres	Width of fibres
1	24	3
2	45	6
3	32	5
4	17	7
5	25	3
6	40	5
7	49	7
8	24	3
9	32	3
10	33	5
11	27	4
12	44	5
13	28	3
14	56	7
15	70	7
16	26	3
17	33	4
18	24	3
19	24	4
20	36	5
Total	761	97

Table 5: Pholem fibres

Pholem fibres	Minimum	Average	Maximum
Length µ	278.4	440.8	812
Width µ	34.8	56.26	81.2

Table 6: Determination of vein islet, vein termination and stomatal number

Character	Minimum	Average	Maximum
Vein islet number	3	4.4	6
Vein termination number	1	1.9	3
Stomatal number	9	11.4	16

Preliminary phytochemical investigation[14,15,16,17]

The qualitative chemical test of various extracts of *Morus alba*.Linn was carried out using standard procedure. (Table 9)

Table 7: Determination of stomatal index

Stomatal index	Minimum	Average	Maximum
Upper edpidermis	10.17	20.17	36.71
Lower edpidermis	16.17	21.71	31.04

Table 8: Determination of Palisade ratio

Minimum	Average	Maximum
18.75	23.5	27.25

Results and Discussion

Pharmacognosy

Microscopy of the leave showed presence of midrib portion, lamina portion. Upper epidermis consists of single layered, rectangular cuticularised from outer walls. Also unicellular covering trichomes could be seen. Immediately below the upper dermis a single layer of palisade cells could be seen where the cells are arranged compact and radially elongated. The mesophyll is made of many layered, loosely arranged spongy parenchyma. The lower epidermis is identical to the upper epidermis. Just above the lower epidermis, two – four layers of collenchymatous cells were present. Powder of the leaves was subjected to macroscopical and microscopical analysis. Colour, odour, taste and texture of the the powder are green, odour characteristic and coarse respectively. Powder microscopy of the leaves showed the presence of unicellular covering trichome, paracytic stomata, collenchymatous cells, spiral type of xylem vessels are also seen. Linear measurement of trichome and phloem fibres was done wich inferred that the ranges for length and width of trichomes and the length and width of phloem fibres were identified.

Table 9 : Phytochemical analysis

Name of the Constituents	Hexane extract	Chloroform extract	Ethyl Acetate extract	Ethanol extract
Fixed oil	+	-	-	+
Carbohydrates	+	+	-	+
Protein	-	+	-	+
Tannin	+	+	+	+
Alkaloids	+	+	-	+
Sterol	+	+	+	+
Flavanoids	+	+	+	+
Glycoside	+	+	+	+
Saponins	+	-	-	+

The leaf constants such as vein islet number, vein termination number, and stomatal index and palisade ration were studied. Vein islet number – 3-6 .Vein termination number – 1-3. Stomatal index of Upper epidermis - 10.17 -36.71, Lower epidermis - 16.17 – 31.04, Palisade ratio - 18.75 – 27.25.

Powder analysis

Unicellular covering trichomes have protective function. Collenchyma Parenchymatos peripheral supporting tissue cells are more or less elongated and thickened either at the angles or on walls adjoining inter cellular spaces or tangentially. Palisade tissue the layer or layers of photosynthetic cells beneath the epidermis of many foliage leaves.A stoma is made up of a pair of identical cells called guard cells placed parallel to each other and also form a pore in the center through which gaseous exchange take place. Paracytic stomas are present, which are two subsidiary cells are parallel to that of stoma. Xylem vessels is the main water conducting tissue of pant always associated with phloem in the vascular tissue. Type of thickening xylem vessel in lignified. Type of thickening is reticulate and scalariform.

Preliminary phytochemical investigation

Preliminary phytochemical screening of the *Morus alba*. Linn plant powder was done per standard methods and results are presented in the Table 9. Hexane, Chloroform, Ethanol and Ethyl acetate extracts shows the presence of carbohydrate, Aminoacids, glycoside, phytosterols ,alkaloids, tannins, steroids ,flavanoids and saponin. The medicinal properties exhibited by this species are due to the presence of alkaloids, flavanoids and glycosides.

Conclusion:

The leaves of *Morus alba* Linn collected from Madurai, Tamilnadu, India were subjected for macroscopy,microscopy and preliminary phytochemical analysis.The objective of investigations was to ease the identifications of the species both in whole and powdered form. The presence of valuable phytoconstituents such as phytosterols, glycosides also demand further phytochemical studies of the species.

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