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Review article *Ayurvedic research*

A review on study of katphala (Myrica Esculenta) W. S. R. to *Tamaka shvasa* (Bronchial Asthma)

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ABSTRACT

At present many chronic recurrent airway disorders are increasingly seen all over the glob. *Ayurveda* has described *Tamaka Shvasa* (Bronchial asthma) as one of such disorders. Bronchial asthma is allergic hyper responsivness of trecheo bronchial tree initiated by immunological mechanism and Katphal (Myrica esculenta, family- myricaceae) is known Ayurvedic traditionally medicine possess anti asthmatic property. Asthma affect more than 300 million people worldwide and it has been estimated that a further 100 million will be affected by 2025. Plants are always an exemplary source of drugs; in fact many of the currently available drugs were derived either directly or indirectly from them. Many experimental research proven the efficacy of Myrica esculenta as anti-asthmatic, anti-allergic, anti-inflammatory properties. Myrica esculenta are widely used for preparation of Ayurvedic formulation like churnas, Asav-arishta, oils, tablets etc. The bark constitute gallic acid, myricanol, myricanone, epigallocatechin 3-*O*-gallate, two prodelphinidin dimmers [epigallocatechin-(4β→8)-epigallocatechin 3-*O*-gallate and 3- *O* galloylepigallocatechin-(4β→8)-epigallocatechin3-*O*-gallate], hydrolysable tannin castalagin. Prodelphinidin units with 2,3-cisconfiguration having average of 5000 mean molecular weight (Mr) were found in the higher mean molecular weight (Mr) fractions. Theterminal unit of the polymer has epigallocatechin 3-O-gallate, theextender units were also known to have galloyl group at C-327.Gallic acid, lupeol, oleanolic acid and stigmasterol were evaluated by HPTLC in bark extract. Present study review information about use of myrica esculenta in bronchial asthma.

Keywords: Katphal, Myrica Esculenta, Bronchial Asthma.

INTRODUCTION

Asthma is a chronic inflammatory condition of the lungs. It has no known distinct etiology, and there are many different clinical manifestations, making asthma a syndrome rather than a specific disease. The socioeconomic burden of asthma is high, with over billion money spent in treatment. The prevalence of asthma is increasing worldwide. The reasons for this increase are likely due, in part, to increased exposure of susceptible individuals to indoor air pollutants or allergens, and perhaps also to a changing microbiological environment that impacts immune system development.[1] Treatment of asthma in people needs much more attention and care. Corticosteroids

can cause softening of bone resulting into fracture of fragile bones. The main side effects of inhaled steroids are cough, dysphonia, and oral thrush. High-dose inhaled steroids may induce systemic effects, including rare instances of adrenal suppression, increased intraocular pressure, cataracts, and potential for increased bone loss. Incidence of acquiring tuberculosis also increases in patients who are on corticosteroids. [2]

People suffering from *Tamak Shvasa (Bronchial asthma)* are helpless and looking forward to alternative answer particularly towards Ayurved.

Plants are always an exemplary source of drugs; in fact many of the currently available drugs were derived either directly or indirectly from them. In the past decade, research has been focused on scientific evaluation of traditional drugs of plant origin for the treatment of various diseases. Since the time immemorial, various herbs are used as antiasthmatic with efficient therapeutic response.[3] A significant number of modern pharmaceutical drugs are thus based on or derived from medicinal plants.[4] In Sanskrit Kataphala is the name of plant. In Ayurvedic literature said properties of this plant is Shvashara (decreases breathlessness), kasahara (decrease cough), Kaphavatahara (alleviation of Kapha and Vata Dosha) [5] Mainly root, fruit and bark are used for medicine.Myrica esculenta uses in so many Ayurvedic formulations like Maha vatagajankush rasa, Bala taila, Mahavishagarbha taila etc.[6] This review of article provide systematic information on use of Myrica esculenta in Bronchial asthma.

AIMS & OBJECTS

1. To study the drug *Katphala* (*Myrica esculenta* Buch-Ham) from *Ayurvedi*c as well as modern point of view.
2. To carry out pharmacognostical, pharmacological and phyto-chemical studies of drug *Katphala.*
3. To study the disease '*Tamaka shwasa'* from *Ayurvedi*c point of view with its possible correlation with the modern disease 'Bronchial asthma'.

SYNONYMS

Myrica esculenta Buch.-Ham. (Myricaceae)[7-8]

BOTANICAL DESCRIPTION OF KATPHALA [9]

Taxonomic position	–
Kingdom	- Plant
Division	- Spermatophyta
Sub-division	- Angiospermeae
Class	- Dicotyledonae
Sub-class	-Monochlamydeae
(Incompletae or Apetalae)	
Series	- Unisexuale
Family	- Myricaceae
Genus	- Myrica
Species	- esculenta Buch – Ham
(Synonym – Myrica nagi Thunb).	
Sanskrit Synonym	: Mahavalkala

Regional Names

Assamese	: Vdulbark, Ajooree
Bengali	: Katphal, Kayphal, Kaychhal
English	: Bay Berry, Box Myrtle
Gujrati	: Kayphal
Hindi	: Kayphal
Kannada	: Kadujai Kai, Katphala,
Malayalam	: Marut
Marathi	: Kaayphal
Punjabi	: Kanphal, Kayphal
Tamil	: Marudam, Marudampatai
Telugu	: Kaidaryamu

Morphology of M. esculenta[10]

This family got only one genus i.e. Myrica and 45 species. In India only one species occurs.

Habitat

A genus of shrubs or trees distributed over temperate and sub-tropical regions of both hemispheres, except Australia.

Habit –Trees or shrubs, aromatic and glandular.

Leaves –Alternate, stipules none.

Inflorescence –Unisexual, in cylindric bracteate catkin like spikes. The male spikes sometimes fascicled or panicled. The female always solitary, occasionally a few female flowers at the top of the male spikes.

Perianth – None.

Male flowers

Male flowers often surrounded by two or more bracts; stamens 2 – 16, usually 4; filaments short, free or connate; anthers erect, two celled.

Macroscopic

Drug occurs in pieces of variable length, 1-2.5 cm thick, slightly quilled, fissured longitudinally and transversely, outer surface rough, grey to brownish-grey, inner surface dark brown and smooth; fracture, hard; taste, bitter.

Microscopic

Mature stem bark shows multilayered cork, composed of rectangular, tangentially elongated, thin-walled cells, some filled with red contents; secondary cortex a wide zone, composed of thin-walled, rectangular to polygonal, parenchymatous cells, a number of cells filled with red coloring matter and simple, round to oval starch grains measuring 6-11 µ in dia.; a number of stone cells, in singles or in groups, circular polygonal or oval, thick walled, lignified with simple pits and radiating canals, found scattered throughout secondary cortex; secondary phloem consists of sieve elements, phloem fibers, crystal fibers, stone cells and phloem parenchyma traversed by phloem rays; numerous prismatic crystals of calcium oxalate present in secondary phloem; phloem fibers with blunt or pointed end and highly thick-walled, with very narrow lumen present in groups; stone cells similar to those found in secondary cortex, mostly in singles or in groups of 2-3, sometimes associated with fiber groups in phloem parenchyma; in isolated preparation and tangential sections crystal fibers show more than twenty chambers having single prismatic crystals of calcium oxalate in each chamber; a number of phloem parenchyma cells containing red coloring matter; phloem rays 1-4 seriate, containing red coloring matter. Powder - Rusty red; shows a number of stone cells, phloem fibers, crystal fibers and prismatic crystals of calcium oxalate and simple, round to oval, starch grains measuring 6-11 µ in dia.

Physical consent

Singh J, 1986, calculated the percentage extractives W/W in different solvents, total ash and acid insoluble ash of Bark are tabulated in (Table 1)

Table.1. Percentage extractive and ash in the bark of *M. esculenta*[11]

	Item	Percentage(W/W)
a.	**Extractives**	1.8400
	I Ether extractive	3.0400
	II Chloroform extractive	28.3200
	III Alcohol extractive	21.2800
	IV Water extractive	
b.	**Ash values**	
	I Total ash	3.3312
	II Acid insolubleash	1.2300

PROPERTIES AND ACTION [12]

Rasa : Katu, Tikta, Kashaya
Guna : Laghu, Tikshna
V¢rya : Ushna
Vip¡ka : Katu
Karma : Kaphavatahara, Dahahara, Mukharogasamaka, Dhatuvikarajit, Rucya

USES

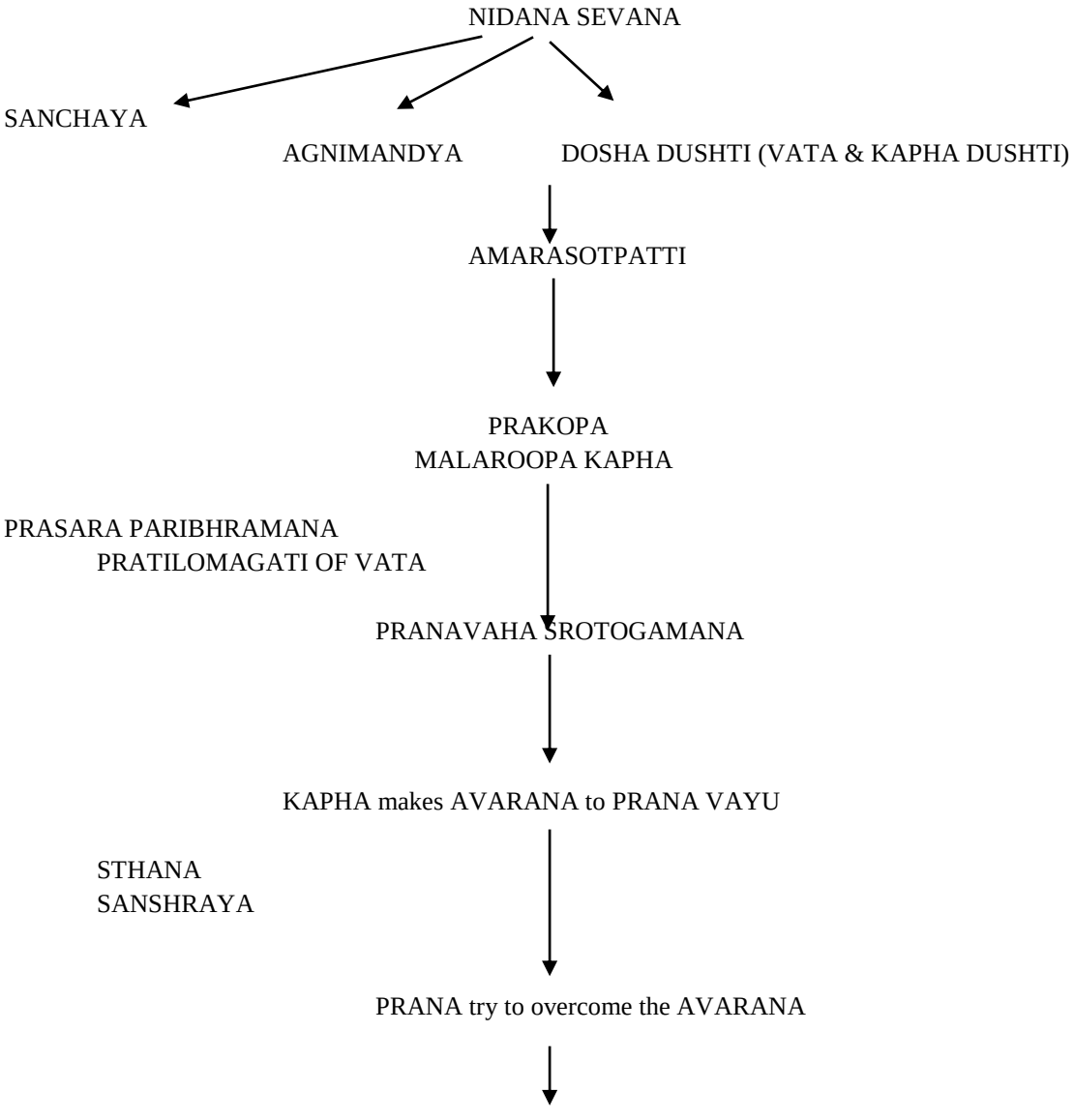
In Ayurveda system of medicines, this tree is utilized for its bark, flowers, fruits and roots. In Ayurvedic system of medicine, the bark is quoted as acrid, bitter, pungent, and heating and finds its application in reducing inflammations. This tree is also utilized for its applications such as acting as a great remedy in anemia, asthma, bronchitis, cough, chronic dysentery, fever, liver complaints, nasal catarrh, piles, sores, throat complaints, tumors, ulcers, urinary discharges.[13] However, Ayurvedic Samhita mentions *Myricaesculenta* to be harmful to liver and spleen. In contrary to this, oil extracted from the flowers acts as a tonic, and has been used useful in earache, headache, diarrhea and paralysis [14]. Fruit constituents exhibit healing properties in case of different ulcers, it also finds application in retention of placenta and bone fracture [15]. Due to the high medicinal values, the leaves and bark of

this medicinally important tree are imported and exported [16]. Fruits are utilized in food industries in Himalayas in different forms like syrups, jam, and squash [17]. Locals in Arunachal Himalaya, India, utilize the tree as timber, for fuel wood and as a wild edible fruit in their diet. [18]. Even the yellow color extracted from the bark is used as a Medicinal colorant [19] traditionally, it was found that the bark of the tree has been used as a fish poison [20].

Myrica esculenta Buch. Ham. (Syn. *Myrica sapida*, Family Myricaceae, commonly known as Kaiphal) is known traditionally in Ayurveda for the treatment of asthma and bronchitis.[21-22] Antiallergic and anti-inflammatory activity of ethanol extract of aerial parts using acetic acid induced vascular permeability and allergic pleurisy in mice methods at doses 75 and 150 mg/kg.[23] Stem bark of this plant possesses bronchodilator and antianaphylactic activity by inhibiting acetylcholine induced bronchospasm in guinea pigs, egg albumin induced anaphylaxis in guinea pigs at dose 75 mg/kg and by relaxing histamine and acetylcholine induced guinea pig trachea and ileum.[24]

DISEASE REVIEW

Schematic representation of samprapti [25]



OVERVIEW OF ASTHMA PATHOPHYSIOLOGY [26]

The inflammation involved in asthma extends throughout the respiratory tree (Figure 1). The clinical manifestations of asthma are a consequence of the effects of this inflammation on the airways and surrounding lung parenchyma, resulting in airway narrowing, airflow limitation, and alterations in lung mechanics.

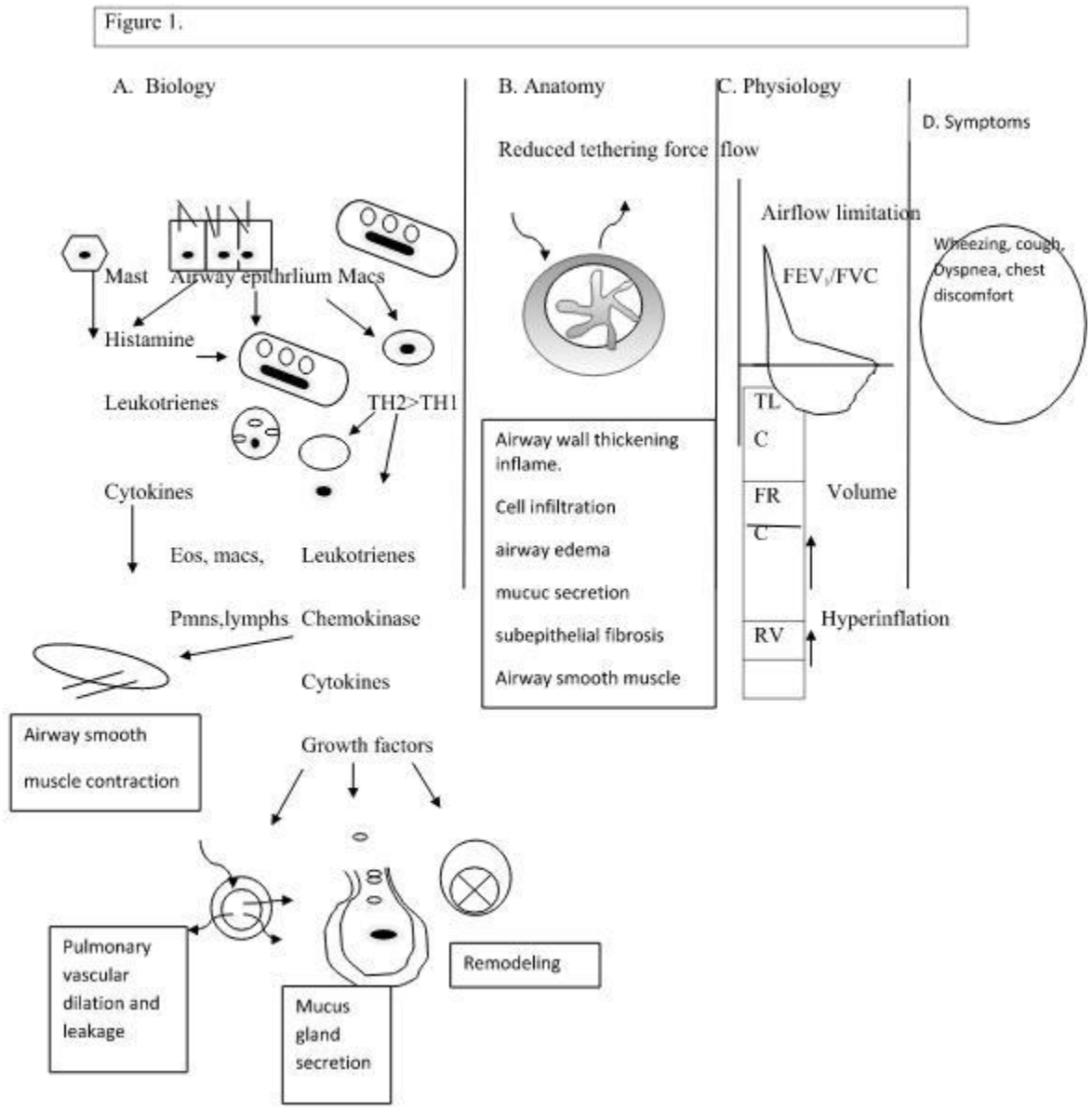


Figure 1

Overview of asthma pathophysiology

Biology

The biology of asthma involves the release of mediators, cytokines, and other signals from activated inflammatory cells, resulting in airway smooth muscle constriction, pulmonary vascular dilation and leakage, and mucous gland secretion. Over time, these processes result in airway remodeling. Macs, macrophages; eos, eosinophils; pmns, polymorphonuclear leukocytes; lymphs, lymphocytes; TH1, TH2, T-helper cell type 1, 2. B:

Anatomy. Airway remodeling is seen by airway wall thickening from inflammatory cell infiltration, airway edema, increased mucus secretion, subepithelial fibrosis and increased smooth muscle mass. In addition, there may be a loss of the linkage between the airway wall and surrounding tethering elements of the alveoli. C: Physiology. The physiological effects of the narrowed, thickened airways are airflow limitation and gas trapping, resulting in hyperinflation. D: Symptoms. The symptoms arising from these underlying pathophysiological changes include wheezing, cough, dyspnea, and chest discomfort.

Probable action of myrica esculenta in bronchial asthma

Charak highlighted that *Shaman (pacifying)* should be preferred among all available treatment. *Charak* quoted the concepts which suggest that drug should have the action of *Vatakrit* (to increase *Vata*) and *Kphahara* (to decrease *Kapha)*. *Vatakrit (*to Increase *Vata)* action will aggravate *Vayu* because of which expulsion of *Kapha*, which responsible for *Marga-Avarodh* (Obstruction) in *Pranavaha Srotas* (Respiratory system), is possible. [27]

Katphala, as explained, is having *Katu Rasa(pungent rasa), Ushna Virya (Hot potency), Katu Vipak* and alleviate *Kapha*, As well as because of *Katu Rasa*, it might be aggravating *Vayu*. Aggravation of *Vayu* might be augmenting the expulsion of *Kapha* from the body, which is main responsible factor to manifest *Marga Avarodh* (Obstruction) and in consequence, aggravation of *Vayu* might be responsible for *Sankochana* (Contraction-spasm) of *Pranavaha Srotas*. As *Kapha* is expelled from the body, alleviation of *Vayu* might be there. Thus the concept, described by *Charaka* and commented by *Chakrapani* is established i. e. *Vatakrit-Kaphahara (Increase Vata-Decrease Kapha)* drug such as *Katphala* might be responsible for the alleviation of *Shvasakashtata* (Breathlessness), *Kasa* (Cough) and *Kaphashtivan* (Expectoration).[28]

Pharmacology of katphala

Only the pharmacology of the bark of Myrica esculenta is found in almost all the text books; the reason being that only the bark is reported to be of medicinal importance.

The bark of M. esculenta is astringent, carminative, antiseptic, useful in fever, Asthma, cough; Powdered and used as snuff in catarrh with headache, mixed with ginger used as a rubificiant application in cholera, fish poison.

Glossary of Indian Medicinal Plants

The bark of the Katphala is astringent, carminative and antiseptic. A decoction of the bark is considered useful in asthma, diarrhoea, fevers, lung affections, chronic bronchitis, dysentery and diuresis. The bark is chewed to relieve toothache and a lotion prepared from it is used for washing putrid sores. The bark is reported to be used in Khasi hills as a fish poison. Fruits are considered pectoral, sedative, stomachic and carminative.

Wealth of India, Vol. VI

The bark has a sharp, bitter, astringent taste; tonic, carminative; useful in inflammations, headache, nasal catarrh, piles, gleet, liver complaints, ozaena, sores, chronic bronchitis, asthma, a good uterine stimulant. The oil from flower is tonic; useful in earache, diarrhoea, and inflammatio, paralysis (Yunani). The powdered bark is occasionally used as a snuff in catarrh with headache.

Indian Medicinal Plants by Kirtikar & Basu.

The bark is widely used in Indian System of medicine as astringent, carminative, antiseptic and in the diseases supposed to be caused by deranged phlegm, such as catarrhal, fever, cough and affection of throat. Pharmacognostic evaluation of Katphala by J. Singh, V. K. Lal & V. P. Trivedi CCRAS.

PHYTOCHEMISTRY OF MYRICA ESCULENTA BUCH -HAM (MYRICACEAE)

Table – 2 Summery of phytochemistry of Myrica esculenta Buch.-Ham. (Myricaceae)

Plant part	Phytoconstituents
Fruit[29]	Reducing sugure, tannins, vitamin C Gallic acid, catechin, chlorogenic acid, p-coumaric acid

Leaves[30]	Two flavonoid glycosides- 1) flavone 4'-hydroxy-3',5,5'-trimethoxy-7-O-β-I-D-glucopyranosy)(1→4)-α-L-rhamnopyranoside 2) flavone 3',4'-dihydroxy-6-methoxy-7-O-α-L-rhamnopyranoside with three known compounds β-sitosterol, β-sitosterol-β-D-glucopyranoside and quercetin have been isolated from the leaves of *Myricaesculenta*.
Bark[31]	gallic acid, myricanol, myricanone,epigallocatechin 3-*O*-gallate, two prodelphinidin dimmers[epigallocatechin-(4β→8)-epigallocatechin 3-*O*-gallate and 3- *O*galloylepigallocatechin-(4β→8)-epigallocatechin3-*O*-gallate],hydrolysable tannin castalagin. Prodelphinidin units with 2,3-cisconfiguration having average of 5000 mean molecular weight (Mr)were found in the higher mean molecular weight (Mr) fractions. Theterminal unit of the polymer has epigallocatechin 3-O-gallate, theextender units were also known to have galloyl group at C-327.Gallic acid, lupeol, oleanolic acid andstigmasterol were evaluated by HPTLC in bark extract.

CONCLUSION

Myrica esculenta Buch.Ham. (Syn. Myrica sapida, Family Myricaceae, commonly known as Kaiphal) is known traditionally in Ayurveda for the treatment of asthma and bronchitis. The bark to be acrid, bitter, pungent,useful in disorders relating to vata and kapha. The bark constitute gallic acid, myricanol, myricanone, epigallocatechin 3-O-gallate, wo prodelphinidin dimmers [epigallocatechin-(4β→8)- epigallocatechin 3-O-gallate and 3- Ogalloylepigallocatechin-(4β→8)-epigallocatechin3-O-gallate],hydrolysable tannin castalagin. Prodelphinidin units with 2,3-cisconfiguration having average of 5000 mean molecular weight (Mr)were found in the higher mean molecular weight (Mr) fractions. Theterminal unit of the polymer has epigallocatechin 3-O-gallate, the extender units were also known to have galloyl group at C-327.Gallic acid, lupeol, oleanolic acid and stigmasterol were evaluated by HPTLC in bark extract which is responsible for action. The M. esculenta possesses unique medicinal and industrial values. The bark of the species is known to possess many medicinal properties and have industrial use as well. Bark is used for tanning and dyeing, yellow colored dye. It is astringent, carminative and possesses antiseptic properties. Decoction is considered to be useful in asthma, diarrhea, fever, chronic bronchitis, lung infections, and dysentery and stomach problems. Myrica esculenta is the main ingredient of so many Ayurvedic formulations like Pushkarmuladi Kwatha (Decoction form), Pushyanug churna(Powdered form), Vatagajankush rasa, Vishagarbha taila etc. M esculenta might be the miracle herb for the patients having Broncheal asthma. Clinical trial of this drug must be carried out by researcher.

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