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An overview on Maricha;Piper nigrum;Linn. with special reference to Ayurvedic and modern aspect

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ABSTRACT
Piper nigrum, Linn. commonly known as Maricha, which is one of the widely used species considered as "The King of Spices".It has typical pungent odour.Maricha(Black pepper) is found largely and is cultivated in Western Ghats of Kerala.It is climbing shrub.InAyurveda, Maricha is used in agnimandya(decreased appetite), ajirna(indigestion), visuchika(cholera), kasa(cough), shwasa(asthma), krimiroga(worm disease) etc.Trikatu has three ingredients, Maricha (Piper nigrum) is one of them. Maricha contains piperine alkaloid which has pharmacological activities like antioxidant, antipyretic,antifungal, anti-obesity, antibacterial, hepatoprotective etc.Maricha is included in various ayurvedic formulations and also it is used as single drug.The review article includeinformation on habitat,cultivation and propagation,phytochemical constituents,pharmacological activities,traditional uses and the therapeutic uses of Piper nigrum.
KEYWORDS –Maricha, Pipernigrum, Phytochemical, Pharmacological.

I. INTRODUCTION:

Ayurveda is a traditional system of Indian medicine used over thousands of years for healing and well being of body. The latin name of Marichais Piper nigrum.It belongs to the family Piperaceae.It is a climbing shrub. It is world's most traded spices.Maricha (Piper nigrum) is native to the Malabar coast of India. Black pepper consists of dried, fully developed unripe fruits, which is used in Ayurvedic formulations.Piper is derived from the Greek word Peperi and nigra means black because colour of fruits is blackish grey.It has pungent smell. Maricha is teekshna(tissue penetrating), ruksha (ununctous), ushna(hot). The etymological derivation of Maricha indicates that which nullifies poison or which neutralizes all types of toxins. The chief activity of Maricha is Pramathi.This means it has potential to clear congestion in strotasas (body channels) by penetrating congestion itself.

AYURVEDIC CLASSIFICATION:
According to different Samhitas / Nighantus :[1,2,3,4,5,6,7,8,9,10]

CharakSamhita–Dipaniyamahakashaya, Shulaprashamanamahakahshaya, Krimighnamahakashaya, Shirovirechanopagamahakashaya.
Sushrut Samhita–Pippalyadigana, Trikatu, Chaturushna, Shadushana
AshtangHridya–Vatsakadivarga
Dhanwantari Nighantu– Shatapushpadivarga
Madanpal Nighantu – Shunthyadivarga
RajNighantu–Pippalyadivarga
Bhavaprakash Nighantu– Haritakyadivarga
Nighantu Adarsha- Pippalyadivarga
Priya Nighantu–Pippalyadivarga
Kaiyadeva Nighantu–Aushadhivarga
Types of Maricha :[1,2,3,4,6,11]

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Sr.No.	Nighantu	Number of types	Types
1	Charaka AshtangHridya	2	1.Maricha 2.Shweta Maricha
2	Sushruta	2	1.Maricha 2.Sita Maricha
3	Dhanwantari Nighantu	2	1.Maricha 2.Sita Maricha
4	Raj Nighantu		Shweta Maricha has mentioned separately
5	Yoga Ratnakara	3	1.Shweta Maricha 2.Kshupaja 3.Brihat Maricha

L.N.= Piper nigrum

Taxonomical classification of Piper nigrum :[12]

Kingdom- Plantae
Subkingdom - Tracheobionata
Division - Magnoliophyta
Class - Magnoliopsida
Subclass - Magnoliadae
Order - Piperales
Family - Piperaceae
Genus - Piper
Species - nigrum

Nirukti :[13,14]

Shirovritta– Sheerhabhagevruntamasya
Krishna – Krishnavarne
Shyaama – Shyamammaricham
Vallija – Vallayamlatayamjayateiti
Vellajam – Vellayatiprasaratiitivella
Ushnama – Ushati Daham rujashchjanayatiiti
Ruksha – Rukshgunayukta
Katuka – Katu rase vipakech
Maricha – Mriyatenashyatishleshmadikamaneniti Mriyatevishamanenitimaricham
Palitam – Pale bhavektaha
Jaraskeshadishoklyamkeshapakaha
Kaphavirodhi – Shleshmanashake
Veera – Prakrushtviryayuktam
Dharmapatana – Dharmapatanejatam
Kolaka – katu; kolakapattanevyavahrutamiti
Shakhanga – Shakhasyaangam iv maricham
Yavaneshta – Yavanamishtam

ParyayofMaricha:[4,5,6,7,9,10]

Paryaya	Dhanwantari Nighantu	Madanpal Nighantu	Kaiyadeva Nighantu	Bhavprakash Nighantu	Raj Nighantu	Priya Nighantu
Krishna	+	-	-	+	+	+
Shyaama	+	+	+	-	+	-
Suvritta	-	-	+	-	-	-
Shirovritta	+	-	+	-	+	-
Vellajam	-	-	+	+	-	-
Vallija	+	+	-	-	+	-
Vrittaphala	-	-	-	-	+	-
Katuka	-	-	-	-	+	-
Ruksha	-	-	-	-	+	-
Kola	+	-	-	-	+	-
Charmabandhanam	-	-	+	-	-	-
Palitam	+	-	-	-	+	-
Ushanam	+	+	+	+	+	-
Veera	-	-	-	-	+	-
Kaphavirodhi	-	-	-	-	+	-

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Dharmapattan	+	-	-	+	+	-
Sarvahitam	-	-	-	-	+	-
Kolaka	+	-	-	-	-	-
Malinam	-	+	+	-	-	-
Shakhanga	-	-	-	-	+	-
Yavaneshta	+	-	+	-	+	-
Saptabhookyam	-	-	-	-	+	-

Vernacularnames:[15]

Language	Name
English	Pepper
Hindi	Kali mircha
Kannada	Kare manesu
Marathi	Mire
Bengali	Golmaricha
Arabic	Philphilasvad
Persian	PhiphilSyah
Malyalam	Nallamuluku
Telugu	Shavyamu

Raspanchak :[1,2,3,4,5,6,7,9,10]

Sanhita/Nighantu	**Ras**	**Vipak**	**Veerya**	**Guna**
Charak[11]	Katu	-	Natyarthaushna	Laghu
Sushrut[12]	Katu	Madhura(ardra)	Ushna	Guru (ardra) Laghu(shushka)
AshtangHridya[13]	Katu	Katu	Ushna	Laghu
DhanwantariNighantu[14]	Katu,Tikta	-	Ushna	-
BhavaprakashNighantu[16]	Katu	Madhura (ardra)	Ushna Natyushna(ardra)	Tikshna,Ruksha,Ushna (shushka) Guru(ardra)
Rajnighantu[15]	Katu,Tikta	-	Ushna	Laghu
MadanpalNighantu[19]	Katu	Madhura (ardra)	Ushna(shushka) Natyushna(ardra)	Tikshna,Ruksha (shushka) Guru(ardra)
KaiyadevaNighantu[17]	Katu	Madhura(ardra) Katu(shushka)	Ushna(shushka) Natyushna(ardra)	Guru,Tikshna(ardra) Laghu,Tikshna,Ruksha (shushka)
Priya Nighantu[20]	-	-	Ushna	Tikshna

PanchabhautikSanghatan:

Sr.No.	Raspanchaka		Prithvi	Jal	Tej	Vayu	Akash
1	Rasa	Katu	-	-	+	+	-
2	Veerya	Ushna	-	-	+	-	-
3	Vipaka	Katu	-	-	+	+	-
4	Guna	Laghu	-	-	+	+	+
		Tikshna	-	-	+	-	-
			0	0	5	3	1

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Conclusion – Tejmahabhutadhikya is there in Maricha.
Inpanchbhautiksanghatan,

-Due toKatu rasa (Vayu + Tej) Maricha is kaphahara,medohara,deepaniya.
-Due to Katuvipaka(Vayu + Tej) Maricha is kaphavatahara,Shoolahara,Shwasahara.

Karmas ofMaricha:[1,2,4,5,6,7,9,10]

Karma	Ch.S.	Su.S.	DN	KN	RN	BPN	M.N	P.N
Deepana	+	-	-	+	-	+	+	-
Grahi	-	-	-	-	-	-	-	+
Avrishya	+	+	-	+	-	-	-	-
Chakshushya	-	+	-	-	-	-	-	-
Krimighna	-	-	+	+	+	+	+	-
Pramathi	-	-	-	-	-	-	-	+
Rochana	+	-	-	+	+	-	-	-
Shoolahara	-	-	-	+	-	+	+	-
Shwasahara	-	-	-	+	-	+	+	-

Rogaghnata :[1,2,3,4,5,6,7,10]
Charaka–Kasa(Cough), Kushth (Skin disease)
Sushruta–Apatanak (Hysteria)
Ashtanghridya – Atisar(Diarrhoea)
Dhanwantari Nighantu– Jantunashana (Anthelmintics)
KaiyadevNighantu – Krimihara(Worm), Shwasaroga (Asthma), Shoolahara(pain)
Rajnighantu –Krimihara(Worm), Aruchi(Loss of taste), Hridyavikara(Cardiac disease)
Bhavprakash Nighantu – Shwasaroga (Asthma), Shoolahara(Pain), Krimihara(Worm), Atinidra(Sleepiness)
MadanpalNighantu–Shwasaroga (Asthma), Shoolahara(Pain), Krimihara(Worm)

Swaroop[16] **:**
ArohiniLata
Patra – Tambulakar, 5-7 inches length
Pushpa – Small
Phala – Round or egg shaped in bunches, green when unripe, red when ripe, black when dry
Seed–Round

Morphology :[17]
External morphology:

Piper nigrum is a woody climber. Its height may reach upto 10m by using its aerial roots. Each slender spike having 40-50 blossoms of the small flowers. Their appearance changes to yellowish-red upon maturity. At that time, it bears a single seed. It is having drupe fruit which is called peppercorn, greyish black, hard wrinkled, 0.4-0.5 cm in diameter, odour aromatic, taste pungent.

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Internal Morphology:

Piper nigrum fruit consists of a thick pericarp for about one third of fruit and an inner mass of perisperm, enclosing a small embryo; pericarp consists of epicarp, mesocarp and endocarp; epicarp composed of single layered, slightly sinuous, tabular cells forming epidermis, below which are present 1 or 2 layers of radially elongated, lignified stone cells adjacent to group of cells of parenchyma; mesocarp wide, composed of band of tangentially elongated parenchymatous cells having a few isolated, tangentially elongated oil cells in outer region and a few fibro-vascular bundles, a single row of oil cells in the inner region of mesocarp; endocarp composed of a row of beaker shaped stone cells; testa single layered, yellow coloured, thick walled sclerenchymatous cells; perisperm contains parenchymatous cellshaving a few oil globules and packed with abundant, oval to round, simple and compound starch grains measuring 5.5-11.0µ in diameter; having 2-3 components and a few minute aleurone grains.

Habitat[15] –

Piper nigrum is a climbing shrub found in India, Malaysia, Indonesia,Sri Lanka. Largely found in hot and moist parts. In India it is grown in Karnataka, Kerala, Kokan, Tamil nadu.

Cultivation and Propagation[18]:

Piper nigrum is woody climber found in Southeast Asia.The hot and humid climate of Western Ghats is ideal for the cultivation of black pepper. Black pepper grows successfully upto 1500m above mean sea level.Black pepper tolerates temperature between 10^0C to 40^0C.Soil required should be well drained and rich in organic matter.

Propagation of Piper nigrum is through shoot cuttings.It has three types of aerial shoots – terminal shoots, runner shoots originating from base of vines and fruit-bearing lateral branches with limited growth.Runner shoots are used for raising shoot cuttings.Runner shoots from high yielding and healthy vines are kept coiled on wooden pegs fixed at the base of vine to prevent shoots from coming in contact with soil and striking roots.The runner shoots are separated from vines during February – March and after trimming leaves, cutting of 2- 3 nodes each are planted either in nursery beds or in polythene bags filled with fertile soil. Adequate shade and watering be done frequently. The cutting strike roots and become ready for planting in May – June.

Traditional Uses –

- Piper nigrum have been used in traditional medicine for intermittent fevers and to promote the secretion of bile[19].
- The advantage of utilizing black pepper in the treatment of refractory intermittent fevers, which are symptomatic of malarial infections[20].
- In traditional Chinese medicine, black pepper has been used for the treatment of epilepsy[21].
- In traditional Middle Eastern medicine, black pepper has been used as a nerve tonic[22].
- Black pepper have been used in the treatment of asthma and chronic bronchitis in Ayurveda and Unani medicine[20].
- Black peppers have been traditionally used as local anaesthetics[23].

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Part use–
Dried fruit

Chemical constituent of Piper nigrum[24,25]:

Active principal	
Piperine	Flavonoids
Piperanine	Alkaloids
Piperettine	Amides
Piperylin A	Lignans
Piperolein B	Plyphenols
Pipericine	

Matra[16]:
Churna–1 to 3 gram, Kwath–40 to 80 ml

Doses :
In powder form – 1-3 gm
In decoction form – 40 – 80 ml

Formulations :[1,2,3]

Sr.No.	Reference	Formulations	Uses
1	Ch.Chi. 5/65	Tryushanadighrita	Vatajgulma
2	Ch.Chi.5/69	HinguSauvarchaladighrita	Vatajgulma
3	Ch.Chi.5/79	Hingwadichurna	Parshwahridyabastishool
4	Ch.Chi.8/142	Yavanishadavchurna	Hridya, Aruchi
5	Ch.Chi.8/145	Talisadichurna	Kasa, Shwasa
6	Ch.Chi.12/50	Kansa haritaki	Shwasa, Gulma
7	Ch.Chi.13/126	Narayana Churna	Udara roga, gulma
8	Ch.Chi.15/108	Marichadichurna	Vatajgrahani
9	Ch.Chi.23/183	Pippalyadianjana	Vishachikitsa for eyes
10	Ch.K.7/40	Kalyanakaguda	Kasa, Shwasa
11	S.Chi.5/28	Hingwadichurna	Kasa,Shwasa, Gulma
12	S.Chi.13/11	NavayasaLoha	Sthaulya, Pandu
13	S.U.52/22	Marichchurna	Kasa
14	A.H.Chi.3/98	Amritaprashaghrita	Nashtashukra, Brihaniya
15	A.H.Chi.10/16	Talisadichurna	Chardi, Grahani
16	A.H.U.30/22	Chandanaditaila	

PHARMACOLOGICAL ACTIVITIES :

In history of traditional medicine use ofPiper nigrum has revealed it to have pharmacological value as Antimicrobial, Antioxidant, Anti-obesity, Digestive, Antipyretic activity.

1. Antimicrobial activity [26]

Recent study on Piper nigrum, the silver nanoparticles from leaf and stem extract were synthesized and antimicrobial activity of these nanoparticles of Piper nigrum was evaluated against agriculture plant pathogens.These showed the excellent antibacterial activity against plant pathogens.

2. Antioxidant activity [27]

Piper nigrum contains an important source of natural antioxidants.The important role of antioxidants is to protect cells against free radicals, which play role in heart disease, cancer ana other disease. Free radicals are molecules produced when your body breaks down food or when you are exposed to tobacco smoke or radiation.

3.Anti-obesity activity[28]

Black pepper (Piper nigrum) is used as an herbal medicine in obesity.

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4.Antipyretic activity[29,30]

In India, Ayurvedic, Unani and folkore medicines used Black pepper preparations for the treatment of intermittent fever, cold, pain and throat diseases.Analgesic and antipyretic actions of Piper nigrum have been experimented and found strong antipyretic activity.

5.Digestive activity[29,31]

Piper nigrum enhances digestion by stimulation of pancreatic enzymes,to increase saliva production, gastric secretions and to increase the production and activation of salivary amylase.The oral administration of Piper nigrum stimulate the liver to secrete bile acids which in turn play important role in the absorption and digestion of fats.

6.Immunomodulatory activity[32]

Black pepper and cardamom exert immunomodulatory roles. Hence they manifest as natural agents that can promote the maintainance of a healthy immune system. Immunomodulation of Piperine for the use of cytokine change.Dietary intake of piperine reduces the risk of atherosclerosis via hypolipidemic and antiatherogenic effects.

7.Anticancer activity[29]

Piper nigrum showed effective antitumor and immunomodulatory activity. Angiogenesis plays a key role in tumor progression and cancer.Research findings show that Piperine inhibits proliferation and GI/S transition of human umbilical vein endothelial cells.

8.Antidiarrhoeal activity [33]

Aqueous extract of Piper nigrum at a dose of 75, 150, 300 mg/kg produces a significant dose dependent antimotility, antisecretary and antidiarrhoeal effects. This effects is due to presence of alkaloids in Piper nigrum.

II. CONCLUSION–

Piper nigrum is a very rich source of wide variety of chemical constituents, most of which are biologically active.Use of black pepper in traditional medicine made its scope from the kitchen to drugs. It is a plant of high commercial and economical importance. It is used in various Ayurvedic formulations.Piper nigrum fruit have great medicinal value due to alkaloid piperine which is responsible for various pharmacologicalactivities.It alleviates kapha and vata dosha. It is mainly useful in kasa, shwasa, shola, krimiroga. Various researches on Piper nigrum show that it possesses antipyretic, antibacterial, antioxidant,hepatoprotective activity etc. The description of Maricha (Piper nigrum) in Ayurvedic literature including various formulations show its importance in ancient as well as present times.

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