

A COMPARATIVE PHYSICO-CHEMICAL ANALYSIS OF *PIPPALI* (PIPER LONGUM LINN.) COLLECTED FROM *ANOOP* AND *SADHARAN DESHA* OF MAHARASHTRADr. Priya Indurkar*¹, Dr. Chitrarekha Uike²¹Assistant Professor, Department of Dravyagun vigyan, Vilasrao Deshmukh Ayurvedic College & Research Centre Mouda, Nagpur, Maharashtra.²Assistant Professor, Department of Dravyagun vigyan, Smt. Shalinitai Meghe Ayurved College, Bhandara, Maharashtra.***Corresponding Author: Dr. Priya Indurkar**Assistant Professor, Department of Dravyagun vigyan, Vilasrao Deshmukh Ayurvedic College & Research Centre Mouda, Nagpur, Maharashtra. DOI: <https://doi.org/10.5281/zenodo.18875241>**How to cite this Article:** Dr. Priya Indurkar*¹, Dr. Chitrarekha Uike² (2026). A Comparative Physicochemical Analysis Of Pippali (Piper Longum Linn.) Collected From Anoop And Sadharan Desha Of Maharashtra. European Journal of Pharmaceutical and Medical Research, 13(3), 380–384.

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ABSTRACT

Background: *Ayurveda* has described specific region for the availability of medicinal plants. *Ayurveda* have given importance for *Desha* (habitat) in which the plant has grown and also quality of *dravya* depends on its place of origin (*Desha*) and soil (*bhumi*). *Acharya Charaka* described the three regions under *Desha Bheda* i.e. *Anoop Desha*, *Sadharan Desha* and *Jangal Desha*. Standardization of herbal drug is essential for confirmation of drugs identity, purity and assess quality of drug for therapeutic value. **Material & Methods:** Under the heading of Standardization, the various parameters are applied. i.e. Pharmacognostic study, physicochemical study, preliminary phytochemical study, chromatographic study. In this physicochemical study was done. *Anoop desha* sample were collected from Kokan region and *Sadharan desha* sample were collected from Vidharbha region of Maharashtra. Then Authentication done from govt. approved institute. **Result:** After Comparing samples 1 and Sample 2 Values found are Total Ash value is 4.82% & 6.64%, P^H value is 4.87 & 4.82, Water soluble ash is 0.8% & 0.9%, Alcohol soluble Extractive is 15.16% & 18.21%, Acid Insoluble Ash is 0.42% & 0.50%, Loss on Drying is 16.01% & 14.24% respectively. **Conclusion:** In Physicochemical study both samples show nearly similar values in Foreign Matter, Total ash value, Acid insoluble ash, Alcohol soluble extractive, Loss on Drying and pH.

KEYWORD: *Desha Bheda*, *Anoop Desha*, *Sadharan Desha*, Standardization, Physicochemical study.**INTRODUCTION**

Dravyaguna is an inseparable, Fundamental branch which deals with proper collection, identification, processing and storage of the herbal drug its properties.^[1] Now a days due to adverse effect of modern medicine, its high cost and their unavailability causes increasing demand of *Ayurvedic* medicine. As medicinal plants are rich source of bioactive compound. They serve as important raw material for drug production. Hence it is essential to increase the demand by production through cultivation.

Ayurveda has described specific region for the availability of medicinal plants. *Ayurveda* have given importance for *Desha* (habitat) in which the plant has grown and also quality of *dravya* depends on its place of origin (*Desha*) and soil (*bhumi*). *Acharya Charaka*

described the three regions under *Desha Bheda* i.e. *Anoop Desha*, *Sadharan Desha* and *Jangal Desha*.^[2]

Pippali (Piper longum Linn.) is an important and highly valuable medicinal plant of Piperaceae Family. It is one of the essential ingredients in the most of the preparation in *Ayurvedic* products like *Trikatu*^[3], *Panchakol*^[4], *Chyavanprash* and *Dipaniya Mahakashay*^[5] etc. It is considered as revitalizing drug in *Ayurveda*. Piperine, alkaloids with different biological activity commonly occur in fruits of Piper species. It has high medicinal, commercial, economical values.

Pippali mostly occurring in hotter part of India from central Himalaya to Assam, Khasi and Mikir hills, Lower hills of West Bengal and forest of Western Ghats from

Konkan to Kerala also in Nicobar Island i.e., *Anoop Desha* but now a days it is also cultivated in *Sadharan Desha*. According to classical reference of *Charaka samhita* in *Sadharan Desha* features of both *Jangal* and *Anoop Desha* are observed.

Standardization of herbal medicines is the process of prescribing a set of standards or inherent characteristics, constant parameters, definitive qualitative and quantitative values that carry an assurance of quality, safety, efficacy and reproducibility.

Taxonomical Classification

Kingdom	-	Plantae
Division	-	Magnoliophyta
Class	-	Magnoliopsida
Order	-	Piperales
Family	-	Piperaceae
Genus	-	Piper
Species	-	Longum
Scientific name	-Piper longum	

External Morphology^[6]

Habit – Ascending or Prostate.

Stem – Rootstock erect, thick joint, branches stout, cylindrical thickened above nodes, finely pubescent.

Leaves – Alternate, stipulate, stipules above 13cm, membranous, lanceolate, obtuse, falling off soon; Lamina simple, broadly ovate, very cordate with broad rounded lobes at the base, upper leaves sessile, clasping stem; simple, oblong, oval, cordate, subacute, glabrous, thin blade with distinct, reticulate venation, sunken above and raised beneath; upper surface dark green and shining, lower surface dull, veins 3-5 from the base, stipules like those of upper leaves.

Inflorescence- Solitary spikes, with a long slender peduncle.

Flower - Incomplete, unisexual, hypogynous, bracts narrow.

Male spikes-about 25-8 cm long, bracts orbicular, peltate.

Perianth: Absent

Androecium: Stamens 1-4 free filaments short, anthers soft.

Female spikes -13-25 cm long, bracts circular, peltate.

Perianth: Absent

Gynaecium – Carpels 3-4, ovary superior, syncarpous unilocular with single basal ovule, style conical stigmas 3-4, short and persistent

Fruits– Very small, ovoid, sunken completely in fleshy peduncle. The whole structure about 25-38 cm long ovoid oblong, erect, blunt, blackish green.

AIM AND OBJECTIVE

To compare Physicochemical properties of *Pippali* (*Piper longum* Linn.) collected from *Anoop* and *Sadharan Desha* of Maharashtra with special reference to *Desha bheda*.

MATERIALS AND METHODS

Anoop desha sample were collected from Kokan region and *Sadharan desha* sample were Collected from Vidharbha region of Maharashtra. Authentication done from Govt. approved institute. Then the airdried fruits of *Pippali* were powdered by using grinder for further analysis.

PHYSICOCHEMICAL STUDY^[7]

The physical standards help in the assessment of crude drugs. These are rarely constant but help in the evaluation of drug. Quality of the drug can be assessed with this analysis and thus biochemical variation, adulteration, substitution, effects of storage/ treatment occurring in it can be tested.

Foreign Matter

The sample shall be free from visible signs of contamination i.e. mould growth, stones, rodent excreta, insects or any other noxious foreign matter.

For this take 100 g of both samples of fruit powder of *Pippali* were spread in a thin layer in a suitable tray. Then examine in day light with unaided eye.

Loss on Drying

It helps to determine the amount of volatile matter (i.e. water drying off from the drug) for substances appearing to contain water as the only volatile constituent.

For this 10gm powder of both samples of *Pippali* fruits were taken in dried, weighed petri dish. Then Petri dish was kept in hot air oven at 105⁰ C for 2 hrs. Then the Petri dish was taken out and kept in desiccator for cooling for half hour and weighed.

Ash Value determination

Total ash value: The residue remaining after incineration is the ash content of the drug, which represents inorganic salts, naturally occurring in drug or adhering to it or deliberately added to it, as a form of adulteration.

Crucibles were well cleaned, dried well in oven and then weighed to constant weight and labeling was made. Weighed about 2-3 gm of each sample into crucible. These are incinerated on burner, then were kept in Muffle furnace at 4500-6000⁰C. The crucibles containing the ash were allowed to be cooled in Desiccators and subsequently weighed to constant weight. The percentage of total ash with reference to the air dried sample of the genuine sample was calculated. Whole process was repeated for remaining samples, reading taken and calculation done.

Acid insoluble ash

These are part of total ash value obtain by treating it in dilute hydrochloric acid Adhering dirt and sand may be determined by acid-insoluble ash content Inorganic variables like calcium oxalate, silica, carbonate content

of crude drug affects total ash value, such variables are removed by treating with acid.^[53]

Material

Silica crucible, Burner, Whatman's filter Paper, Digital balance, Dil HCl - 25ml, conical flask, powder of *Pippali* fruits sample 1 (*Anoop Desha*) and sample 2 (*Sadharan Desha*).

Procedure

The ash obtained (each sample) was digested with 25 ml diluted hydrochloride acid for 5 min. Filtered through whatman's paper and was washed with warm water. The residue and the filter paper was taken in a crucible and heated gently until vapours cease and then more strongly until all carbon has been removed. It was cooled the residue was weighed and the percentage of acid insoluble ash was calculated with references to air dried drugs.

$$\% \text{ Acid insoluble ash value} = \frac{\text{Wt. of acid insoluble ash}}{\text{Wt. of crude drug taken}} \times 100$$

Water soluble Ash

Material

Silica crucible, Burner, Whatman's filter Paper, Digital balance, Distilled water -25ml, conical flask, Desiccator, powder of *Pippali* fruits sample 1 (*Anoop Desha*) and sample 2 (*Sadharan Desha*).

Procedure

The ash obtained (each sample) was boil with 25 ml distilled water for 5 min. Filtered through whatman's paper and was washed with warm water. The residue and the filter paper was taken in a crucible and heated for 15 min at temp not exceeding 450⁰c. Cool in the desiccator and weigh. Subtracted the weight of the insoluble matter from the weight of the ash. The difference in weight represents the water soluble ashcalculated percentage with references to air dried drugs.

Determination of Extractive value

The extracts obtained by exhausting crude drugs are indicative of approximate measures of their chemical constituents considering the diversity in chemical nature and properties of contents of drug, various solvents are used for determination of extractives.^[8]

1) Determination of water-soluble ash

This method is applied to the drugs which contain water soluble constituents like sugars, plant acids, mucilage, glycosides etc.

Material

Burner, Whatman's filter paper, Digital balance, Distilled water, Fruits powder of *Pippali* sample 1 (*Anoop Desha*) and sample 2 (*Sadharan Desha*).

Procedure

5 gm each sample was macerated and 50 ml of distilled water added to the sample containing flask. With

frequent shaking for first 6 hours, allowed it for standing for 18 hours. Thereafter, filtered rapidly by taking precautions 25 ml of the filtrate were evaporated to dryness in a tarred flat-bottomed shallow dish, dried at 105° in oven and weighed Readings taken and calculation done. Whole procedure was repeated for remaining samples, reading taken and calculation done. The content of the extractable matter is calculated in the following manner.

Determination of alcohol soluble extractive: Method is applied to the drugs which contain alcohol soluble constituents like resins Alcohol is an ideal solvent for extraction of various chemicals.

Material

Burner, Whatman's filter paper, Digital balance, Distilled water, Fruits powder of *Pippali* sample 1 (*Anoop Desha*) and sample 2 (*Sadharan Desha*).

Procedure

5 gm sample of *Pippali* fruits (*Piper longam* Linn.) sample 1 (*Anoop Desha*) was macerated with 100 ml of Ethanol of the specified strength in a closed flask for 24 hours. Shaken frequently during the first 6 hours and allowed to standing for 18 hours.

There after, filtered rapidly by taking precautions against loss of Ethanol. Evaporated 25 ml of the filtrate to dryness in a tarred flat-bottomed shallow dish. Dried at 105° and weighed. The percentage of Ethanol-soluble extractive was calculated accordingly Same processes were repeated for remaining all the samples, readings taken and calculations done.

Determination of pH value

The pH meter is an electronic digital voltmeter, scaled to read pH directly and may ranges from a comparatively simple hand held instrument, to more elaborate bench models, often provided with ascale expansion facility, with a resolution of 0001pH unit and an accuracy of + 0001 unit.

Materials

Glass electrode, pH meter, Beaker, Buffer tablet.

Procedure

About 125 gm of both sample was weighed and transferred to a clean conical flask.

Add 25 ml distilled water. Shake it continuously with the help of clean and dry glass rod for about 45 min. Filter through cotton so as to remove the insoluble portion.

The pH value is found out from pH meter by calibrating it previously with standard buffer solution of pH 4 and 7. Thereby on dipping the electrode in the sample solution pH of the sample can be read from the pH meter.

OBSERVATIONS AND RESULTS

Table 1: Comparative Physicochemical analysis of *Anoop* and *Sadharan Desha* of *Pippali* Fruits (*Piper longum* Linn.) samples.

Parameter	As per API guideline	Sample 1 (<i>Anoop Desha</i>)	Sample 2 (<i>Sadharan Desha</i>)
Foreign Matter	Not more than 2	Nil	Nil
Total Ash value	Not more than 7	4.82 %	6.64 %
pH Value		4.87	4.82
Water Soluble Extractive	Not less than 7	38.46 %	60.91 %
WaterSoluble Ash		0.8 %	0.90 %
Alcohol soluble Extractive	Not less than 5	15.16 %	18.21 %
Acid InSoluble Ash	Not more than 0.5	0.42 %	0.50 %
Loss on Drying		16.01 %	14.24 %

DISCUSSION

Foreign matter

The increased value of foreign matter indicates the reduced purity of the raw drug.

According to API % of foreign matter in Pippali fruit should not be more than 2.

Both samples do not see any % of foreign matter i, e nil.

Loss on drying

LOD value of sample 1 *Anoop desha* is slightly greater i, e. 16.01 % than that of sample 2 *Sadharan desha* i.e.14.24 %.

Total ash value

Total amount of material produced after complete incineration is the total ash value.

It includes oxidation of component in the product.

Total ash value of sample 1 *Anoop Desha* is lower as compare to sample 2 *Sadharan Desha* i.e. 4.82 % and 6.64 % respectively but within a limit of API value.

Acid insoluble ash

Acid insoluble ash value possesses similarity in both samples of *Anoop Desha* and *Sadharan Desha* i.e 0.42 % and 0.5. % respectively.

Water soluble ash

Water soluble ash value possesses similarity in both samples of i.e 0.8 % in *Anoop Desha* and 0.9 % in *Sadharan Desha*.

Extractive values

The nature of chemical constituents present in the drug is indicated by its extractive values. Tannins, sugar, plant acids and mucilage are the water soluble constituents. Alcohol soluble extractive value is applied for the drugs which contain alcohol soluble constituents such as tannins, resins and alkaloids.

Water soluble extractive

Water soluble extractive value is comparatively lower in *Anoop desha* i.e 38.46 % than that of *sadharan desha* i.e 60.91 % but within a limit of API value.

Alcohol soluble extractive

Alcohol soluble extractive value is comparatively lower in *Anoop Desha* i.e. 15.16 % than that of *Sadharan Desha* i.e. 18.21 % but within a limit of API value.

pH analysis

pH indicates acidity or basicity of the substance. pH value of both samples are nearly same i.e 4.87 in *Anoop desha* and 4.82 in *sadharan desha*. Both samples are acidic in nature.

CONCLUSION

Both samples (sample 1 *Anoop Desha* and sample 2 *Sadharan Desha*) show resemblance with characters mention in API i.e Ayurvedic pharmacopeia of India.

In Physicochemical study both samples show nearly similar values in Foreign Matter, Total ash value, Acid insoluble ash, Alcohol soluble extractive, Loss on Drying and pH.

REFERENCE

1. Priyavat Sharma, Dravyaguna vigyana, 1st part, Chaukhamba Bharti Akadami, Varanasi, 2013; 06.
2. Agnivesh, Charaka, Dridhabala, Charaka Samhita, Kalpasthan, Madankalpadhaya 1/7.1, Edited by Prof Ravidutta Tripathi, Chaukhamba Sanskrit pratisthan, Delhi, 2013; 807.
3. Shri Bhavamishra, Bhavaprakash Nighantu, Haritakyadi Varga, Verse 62, Commentary by Prof Krishanachand Chunekar, Edited by late Dr G S Pandey, Chaukhamba Bharti Academy, Varanasi, Reprint, 2018; 18.
4. Shri Bhavamishra, Bhavaprakash Nighantu, Haritakyadi Varga, Verse 72, Commentary by Prof Krishanachand Chunekar, Edited by late Dr G S Pandey, Chaukhamba Bharti Academy, Varanasi, Reprint, 2018; 24.
5. Agnivesh, Charaka, Dridhabala, Charaka Samhita, sutrasthana, Shadvirechaniyaadhya 4/8.9, Edited by Prof Ravidutta Tripathi, Chaukhamba Sanskrit pratisthan, Delhi, 2013; 72.

6. Dr Hema Sane, Botany of commonly used medicinal plants, chapter 60, Piperacea family, first edition, vision publication, Pune, 2014; 286.
7. C K Kokate, Pharmacognosy, Vol I, Analytical Pharmacognosy, Edition Forty sixth, Nirali Prakashan, Pune, Dec 2010; 63.
8. C. K. Kokate, Pharmacognosy, Vol I, Analytical Pharmacognosy, Edition Forty sixth, Nirali Prakashan, Pune, Dec 2010; 623.