

## UNRAVELLING THE VARIETAL COMPLEXITY OF PIPPALI (*PIPER LONGUM* LINN) FRUIT IN RAJA NIGHANTU

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### ABSTRACT

**Introduction:** Pippali (*Piper longum* Linn.) is a celebrated Ayurvedic drug extensively described for its respiratory, digestive, and Rasayana applications. Classical Nighantus, while unanimous on its importance, differ in their classification and description of varieties, reflecting both regional and therapeutic perspectives. **Methods:** A systematic textual review of Raj Nighantu was conducted to document, compare, and analyze the various types of Pippali mentioned. Cross-references from commentaries and modern pharmacognostic data were examined to support identification and interpretation. **Results:** The analysis revealed a broad spectrum of Pippali varieties, including Pippali (fruit), Gajapippali, Simhali Pippali and Vanadi Pippali, with minor variations in nomenclature and identification. **Discussion/Conclusion:** The multiplicity of Pippali across Nighantus illustrates the dynamic nature of Ayurvedic pharmacology, where ecological diversity and clinical specificity shaped classification. Recognizing these textual variations enhances our understanding of Ayurvedic materia medica and invites modern pharmacognostic validation of these traditional categories.

**KEYWORDS:** Pippali, Types, Morphology, Nama Rupa, Identification.

## INTRODUCTION

The story of Pippali (*Piper longum* Linn.), the slender “long pepper,” is not confined to a spice rack or a prescription in Ayurveda; it is a saga of multiplicity, where one name shelters many therapeutic identities. Ayurveda, with its keen eye for subtle variation, does not reduce Pippali to a monolithic drug but unfolds it into diverse forms-Pippali, Gajapippali, Simhali Pippali and Vanadi Pippali. This multiplicity indicates that ancient scholars has a remarkably sensitive pharmacovigilance, distinguishing therapeutic suitability not only by species but by habitat, morphology and potency.

Each variety is more than a botanical curiosity; it is a pharmaco-cultural expression shaped by ecology, geography, and clinical need. From a textual lens, the Nighantus serve as pharmacological maps, each redrawing the boundaries of Pippali according to their context. These variations highlight the Ayurvedic principle that “drug identity is not merely what it is, but where it is, how it is used, and who uses it.” Historically, Pippali traveled beyond India as a precious trade commodity, sought after in Greco-Roman medicine for its pungency and vitality-enhancing properties.

Pharmacologically, this plurality challenges modern science to rethink drug identity. Where biomedicine seeks uniformity, Ayurveda thrives on heterogeneity- accepting that a single genus may embody multiple pharmacodynamic signatures. This philosophy resonates with contemporary pharmacognosy, where chemotypes and micro-environmental factors alter the phytoconstituent profile of the same species. The exploration of Pippali varieties is therefore not only a botanical or pharmacological exercise- it is an inquiry into how tradition encodes diversity, adapts knowledge and aligns therapeutic specificity with ecological reality.

## MATERIAL AND METHODS

- The references were compiled from Raja Nighantu.<sup>[1]</sup>
- Modern pharmacognostic references to validate therapeutic indications from PubMed, Google Scholar.

**Table No. 1: showing the types with their morphological synonyms and Rasa Panchaka.**

S. No.	Variety	Synonyms aid in Identification	Common Name	Botanical Source	Gunash mentioned	Karma
1.	Pippali	Shoundhi Krishna Syama Vaidehi	Long Pepper	<i>Piper longum</i>	Rasa : Katu, Tikta Virya: Ushna Doshagnata : Vatakaphahara	Jwarahara Deepana Kasahara Kshayapaha
2.	Gaja Pippali	Stula Vaidehi Dheergagranthi	long pepper	<i>Scindapus officinalis</i>	Rasa: Katu Guna: Ruksha Virya: Ushna Doshagnata : Balasavatahantri	Stanya vardhini Varna vardini
3.	Simhali Pippali	Lambabija Lambadanta Tamra	Javanese /Balinese Long Pepper	<i>Piper retrofractum</i>	Rasa : Katu Virya: Ushna Doshagnata : kaphavatahara	Jantughni Swanasasini Koshtashodhani
4.	Vanadi Pippali	Shudra	Wild pepper	<i>Piper peepuloides</i>	Guna : Tikshna Virya : Ushna	Ruchya Deepani Unripe (Ama) variety has better properties than dried(sushka) variety.

**Table No. 2: Showing macroscopic characteristics of these 4 Boatnical Sources.**

S. no	Macroscopic Characteristics	<i>Piper longum</i> Linn. <sup>[2]</sup>	<i>Scindapus officinalis</i> Schott <sup>[3]</sup>	<i>Piper retrofractum</i> Vahl <sup>[2]</sup>	<i>Piper peepuloides</i> Roxb <sup>[4]</sup>
1.	<b>Shape</b>	Cylindrical, Elongated, tapering at ends	Fruit is spadix enclosed in a spathe, resembling a small cob.	Fruit is cylindrical, elongated. It is thicker and fleshy compared to <i>Piper longum</i>	Fruit is cylindrical, slender, thin and shorter than <i>Piper longum</i>
2.	<b>Unripe fruit colour</b>	Yellowish Green	Greenish Yellow	Green	Yellowish Green
3.	<b>Ripe fruit colour</b>	Dark Green	Yellow	Red	Light Yellow
4.	<b>Dried fruit</b>	Dark Brown or Black	Yellowish Brown to Brown	Blackish brown with Reddish tinge	Light brown to Reddish Brown
5.	<b>Size</b>	1.8-2.5X6-7.5cm	10-15 cm	5-6.5 cm	0.5 – 1 cm

The comparison of classically documented attributes with contemporary scientific findings demonstrates a strong complementarity between traditional knowledge and modern evidence. Classical Ayurvedic texts characterize dravyas based on Rasa, Guṇa, Vīrya, Vipāka and Karma providing a holistic framework for therapeutic action. This parallel evaluation not only substantiates the classical descriptions but also expands their relevance in current biomedical discourse. The above mentioned 4 varieties are systematically described in this manner.

### 1. Pippali (*Piper longum* Linn.)<sup>[5]</sup>

**Habitat** – Native to the Indo-Malesian region. Found wild in India (central Himalayas, Assam, Khasu and Mikir Hills, Lower hills of West Bengal, Western Ghats from Konkan to Kerala).

**Habit**- Perennial climber

**Morphology** – The roots are woody with numerous wide ovate, cordate leaves. The inflorescence is a cylindrical, pedunculate spike. The fruits are ovoid drupes, small and completely sunk in the fleshy spikes, fused laterally, pungent, aromatic, spicy, shining dark green when immature and blackish green when fully mature. Female spikes arising singly from leaf axil, is cylindrical, short and stout with multiple fruit. Male spikes also arise from the base of the leaf, is single, long cylindrical and of no economic value. The mature female spikes are collected and dried and this is the commercial form of Pippali.

**Phyto constituents** present are- Piperine; Piper longumine; piplartine; longamide; volatile oils (0.7-1%); Lignans and related Phenolics (Sesamin).



## 2. Gaja Pippali (*Scindapus officinalis* Schott)<sup>[6]</sup>

**Habitat** – Indian subcontinent (India, Nepal, Myanmar, China)

**Habit** – Large, Stout, Epiphytic and perennial climber with adventitious aerial roots growing on trees.

**Morphology** – The spadix has thick straight central axis or the peduncle with spirally arranged fruits. The fruits are covered entirely by fleshy perianth.

**Phyto-constituents** present are – Glycosides (Scindapsin A and Scindapsin B); Aglycones (Scindapsinidine A and Scindapsinidine B); simple sugars (Rhamnose;fructose;glucose); Volatile oils.



## 3. Simhali Pippali (*Piper retrofractum* Vahl.)<sup>[7]</sup>

**Habitat** – native to Indonesia, South Asia (Thailand, Malaysia, Philippines, Vietnam)

**Habit** – Perennial, climbing shrub with adventitious roots.

**Morphology** – The leaves are short petioled, green in colour, pale when dry, oblong-ovate or elliptic-lanceolate in shape, 6 to 7.5 cm long and 3-8 cm wide. The male spikes are 3-8 cm long and 2.5 to 4.5 mm in diameter, the bracts are somewhat stalked and peltate. The stamens are stalkless. The female spikes are oblong when matured, red in colour, fleshy, cylindrical 3-6.5 cm long and 6.5 to 11 mm in diameter.

**Phyto constituents** present are – Alkaloids (Piperine, Piperlonguminine; methyl piperate); Glucosides (Retrofractoside E, F); Volatile Oils.



#### 4. Vanadi Pippali (*Piper peepuloides* Roxb)<sup>[8]</sup>

**Habitat** –found in subtropical forests in the Himalayan foothills and nearby regions: Bangladesh, Bhutan, India (especially Northeast-Meghalaya, Sikkim, Darjeeling), Nepal, Myanmar.

**Habit** – Climbing Shrub

**Morphology** – Leaves are shortly stalked, Linear or ovate –oblong, long pointed, 5-12.5X 2.5 -5 cm, variable in breadth, sometimes narrowed to a minutely cordate shaped base. Male spikes are slender, 5-7.5 cm long, covered with peltate bracts. Female spikes are 12-16 cm, cylindric, longer than their stalks. Fruit is 2mm in diameter.

**Phyto constituents** present are- Alkaloids (Pellitorine, Pipataline); Volatile oils (Bicyclogermacrene, Pentadecane).



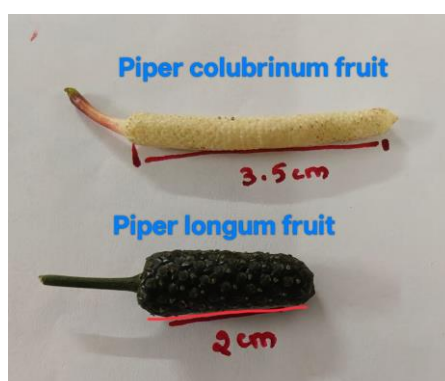
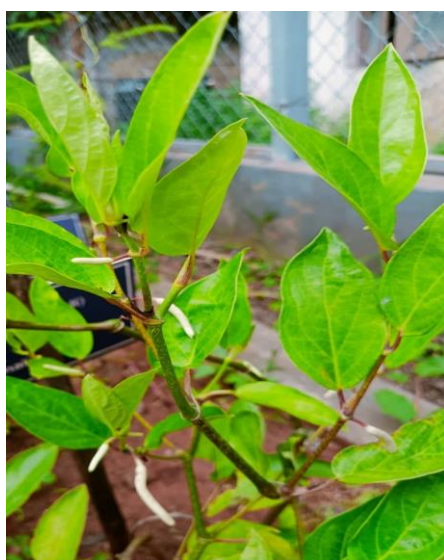
#### DISCUSSION

The identification of any Ayurvedic drug essentially begins with the understanding of its Nāma (name) and Rūpa (form), together termed as Nāma–Rūpa Jñāna, which is considered the very foundation of Dravyajñāna. The ancient scholars have emphasized that the knowledge of any substance arises only through its name and form—“Nāmarūpābhyāṃ dravyajñānam”—highlighting that both linguistic identity and morphological perception are indispensable for accurate recognition of a medicinal plant. The Nāma conveys not merely a title but a condensed expression of the drug’s properties, actions, and traditional context, whereas Rūpa reveals its external and internal characteristics such as shape, colour, texture, and botanical features. The harmony of these two dimensions allows a physician or researcher to distinguish the genuine drug from its look-alikes, thereby preventing substitution or adulteration, which could compromise therapeutic efficacy. In Ayurvedic literature, however, multiple plants sometimes share a single Nāma due to similarities in taste, form, or pharmacological effect, and conversely, a single species may carry several Nāmās across different regions and texts. This complex web of synonymy and polysemy necessitates a deep, discriminative understanding of Nāma–Rūpa Jñāna, supported by classical commentary, regional ethnobotanical correlation, and modern pharmacognostic tools.

The classical drug Gaja Pippalī is an ideal example where the importance of Nāma–Rūpa Jñāna becomes evident. Across classical texts and regional practices, multiple interpretations and botanical substitutions have emerged, leading to significant confusion. Traditionally, Gaja Pippalī has been interpreted as a distinct variety of Pippalī possessing larger fruits resembling the “trunk of an elephant” (gaja), signifying its size and potency. However, this vernacular

similarity in name led to misattributions among several species, mainly *Scindapsus officinalis* (Roxb.), *Piper chaba* Hunter, and *Piper colubrinum* Link. Classical texts like *Bhāvaprakāśa Nighaṇṭu* mention *Cavyā* or *Cavikā* in relation to *Pippalī* and *Gaja Pippalī*, leading many scholars to assume a botanical connection among these three. *Bhāvaprakāśa* clearly states that *Gaja Pippalī* is the fruit of *Cavyā*, prompting commentators such as Nadkarni and Chopra to equate *Gaja Pippalī* with *Cavikā/Cavyā*. Nadkarni, while describing *Piper chaba* Hunter (*Piperaceae*), identifies its root as *Cavyā* and its fruit as *Gaja Pippalī*. However, in his later discussion of *Gaja Pippalī*, both he and Chopra revert to identifying it as *Scindapsus officinalis* (*Araceae*), following Roxburgh's earlier description. This dual approach—one identifying *Gaja Pippalī* with a *Piper* species and another with a non-*Piper* aroid—illustrates a fundamental lapse in *Nāma–Rūpa Jñāna*.

Meanwhile, *Piper colubrinum* Link, another *Piperaceae* species, is now widely accepted by many researchers and pharmacognosists as the authentic source of *Gaja Pippalī*, based on its morphological affinity, fruit resemblance, and chemical composition comparable to *Piper longum*.



Thus, the debate over *Gaja Pippalī* exemplifies how mere reliance on regional names (*nāma*) without corresponding morphological verification (*rūpa*) can create enduring confusion in identification. The principles of *Nāma–Rūpa Jñāna* urge the integration of textual study, field observation, pharmacognostic examination, and phytochemical profiling for conclusive identification. Only through such a comprehensive approach can one ensure the authenticity and therapeutic reliability of classical Ayurvedic drugs, reaffirming the timeless wisdom of the *Dravyaguna Shastra*.

The synonyms mentioned for the types of Pippali in Raja Nighantu show close resemblance to their respective botanical sources.

## CONCLUSION

The exploration of Pippali through various Nighantus reveals that ancient Ayurvedic scholars perceived medicinal identity not as a fixed entity, but as a living expression of nature's variability. The different varieties—Pippali, Gaja Pippali, Simhali Pippali, and Vanadi Pippali—symbolize how Ayurveda integrated ecology, morphology, and clinical application into a single continuum of understanding. This approach demonstrates an extraordinary pharmacological sensitivity, one that recognized how the same genus could embody multiple therapeutic possibilities when influenced by habitat, climate, and cultivation.

The textual analysis demonstrates that Ayurvedic classification was never arbitrary; it was a systematic attempt to relate habitat, form, and function. The Nāma–Rūpa Jñāna framework served as an early scientific tool for authentic identification, ensuring therapeutic precision and preventing substitution. The controversies surrounding Gaja Pippali further emphasize the need for a multidisciplinary approach integrating classical interpretation, field botany, and modern pharmacognostic evaluation.

Hence, the study of Pippali varieties represents more than a textual exploration—it reaffirms Ayurveda's scientific vision of specificity within diversity, where therapeutic identity emerges from the interplay between biological form and environmental context. Recognizing and substantiating these distinctions through modern research will enhance the credibility, safety, and global acceptance of Ayurvedic materia medica.

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