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A COMPARATIVE PHARMACOGNOSTICAL STUDY OF GENUINE AND MARKET SAMPLES OF GAJAPIPPALI WITH SPECIAL REFERENCE TO *SCINDAPSUS OFFICINALIS* SCHOTT.

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ABSTRACT

Looking into the history of Ayurveda, it is evident that the 'Vedas' are the primitive source of knowledge and many medicinal drugs have been described in it. Acharya Charak has said that for the successful management of the disease, it is essential to select proper medicine and examine it in all respects. Correct identification of the drug becomes the main prerequisite for its use as medicine. Acharya Charak has said that "a drug, if unknown, is fatal like poison, weapon, fire and thunderbolt while, if known, is vitaliser like nectar and a drug unknown by its name, form, properties and action and improperly administered even if known is responsible for certain complication". Gajapippali (*Scindapsus officinalis* Schott) belonging to family Araceae is a large epiphyte climbing shrub, rooting freely from the stem, marked with annular scars of fallen leaves. It is commonly found in Sal forests clinging to trees and rocks by adventitious aerial roots. It is described in all the Ayurvedic classics in Brihatrayees, Laghutrayee as well as in all Nighantu's which shows its leading importance and wide utility in therapeutics. The fruits of Gajapippali shows Anthelmintic, Antibacterial, Anti-inflammatory, Analgesic, Antiasthmatic, Antimicrobial, Cytostatic, Anti-oxidant activities. The present study is an attempt of scholar to highlight the pharmacognostical characters of Gajapippali on modern and Ayurvedic bases to give standards for identification of this drug.

Key Words: Gajapippali, *Scindapsus officinalis* Schott, Pharmacognostical.

INTRODUCTION

Gajapippali (*Scindapsus officinalis* Schott) A large epiphyte climbing shrub, rooting freely from the stem, marked with annular scars of fallen leaves. It is one of the most important plant used in Indian system of medicine belongs to family Araceae. It is found almost all Sub-Himalayan tract/ Tropical Himalayas, from Sikkim eastwards, Bengal, Nepal, Odisha, Chhattisgarh, Burma, Andaman Islands between altitudes of 330 and 1000 m. It is commonly found in Sal forests clinging to trees and rocks by adventitious aerial roots. The fruit is pungent, sharp; heating, appetizer; anthelmintic, aphrodisiac, galactagogue; sharpens the hearing, regulates the bowels; useful in dysentery, asthma, troubles of the throat (Ayurveda). In Yunani system of medicine the fruit is aphrodisiac, cardio tonic and useful in ozoena, bronchitis. The dried fruit is a stimulant, diaphoretic, and anthelmintics. Among the Santals the fruit is applied externally for rheumatism (Campbell). A decoction of sliced fruit was tried in cases of asthma and found to act as an expectorant; it did not diminish the severity of the fit (Koman). The juice of the plant is not an antidote to either snake venom (Mhaskar and Caius) or Scorpion-venom (Caius and Mhaskar). Present study is an endeavour of the scholar for collection, comparison and organoleptic analysis of genuine and market samples for identification and quality control of crude drugs traded in the market so as to get inputs on standardization and quality control initiatives.¹

Plant Profile

Taxonomical Classification²

Kingdom	Plantae
Phylum	Tracheophyta
Class	Liliopsida
Order	Alismatales
Family	Araceae
Genus	<i>Scindapsus</i>
Species	<i>officinalis</i>
Botanical Name	<i>Scindapsus officinalis</i>

MATERIAL AND METHODS

The plant material taken for study was Gajapippali Fruit, (*Scindapsus officinalis* Schott), (Araceae) as well as different samples sold in the name of Gajapippali from different markets of India.

Morphological Features³

A large epiphytic climbing shrub, rooting freely from the stem, marked with annular scars of fallen leaves. (Figure 1)

Stem: As thick as the little finger; branches wrinkled when dry.

Leaves

Leaves stalked, dark green, 12.5-25 by 6.3-15 cm, ovate, elliptic-ovate, or nearly orbicular, caudate-acuminate, base rounded or slightly cordate, primary nerves distinct, petiole 7.5-

15 cm. broadly winged up to the knee. Peduncle solitary, terminal, much shorter than the petiole. (Figure 2)

Spadix/Spath

It is straight central axis. The fruits are covered entirely by fleshy perianth which looks like **banana**. In the mature inflorescence the fruits are fused into hard, cylindrical, brownish body within the perianth. (Figure 3)

Fruits

It is a straight, rough, Scaly Cylindrical berry, fleshy, ovate, and cordate with densely packed prismatic truncate ovary. Each fruit contains several seeds. Central core in the transverse section shows circular pieces. (Figure 4)

Seeds

Seeds are kidney- shaped, 0.3-0.4cm wide, 0.4-0.6cm long, smooth, shiny, grayish-brown with a dent. (Figure 5)

Figure 1: Plant of Gajapippali (*Scindapsus officinalis* Schott)

Figure 2: Leaves of Gajapippali (*Scindapsus officinalis* Schott)

Figure 3: Spadix/Spath of Gajapippali (*Scindapsus officinalis* Schott)

Figure 4: Fruits of Gajapippali (*Scindapsus officinalis* Schott)

Figure 5: Seeds of Gajapippali (*Scindapsus officinalis* Schott)

Identification and authentication of collected genuine plant material

For the preparation of Herbarium sheets and other study purposes, plant specimens were collected from their native habitat during the time of flowering/fruiting. The drug Gajapippali flowers during the months of July to September as seen by scholar in the Sal forest of Lachiwala, Dehradun, Uttarakhand and Satakoshia, Mayurbhanja, Odisha. The plant was identified with the help of local flora, guide, co-guide, and then specimen of *Gajapippali* was collected in the month of July. The authentication of plant material collected for study was done by Forest Research Institute (F.R.I) and Botanical Survey of India (B.S.I), Dehradun, Uttarakhand, India. After identification and authentication the mature fruit of *Gajapippali* was collected from above place for research work. (Figure 6,7)

Authentication from FRI, Dehradun.⁴

Herbarium of Genuine Sample Submitted in Forest Research Institute, Dehradun.

Herbarium no-172123, Date- 21/01/2016

Genuine sample authenticated and Submitted in Botanical Survey of India (B.S.I), Dehradun.

Herbarium no-116046, Dt- 22/02/2016.⁵

Collection of genuine sample

For study purpose the genuine sample collected from Satakoshia forest, Odisha dated on 26/12/2015 was coded as **S_(1a)** and from Lachiwala, Dehradun, Uttarakhand on dated 17/11/2015 coded as **S_(1b)**. (Figure 8)

Figure 6: Herbarium Submitted in F.R.I, Dehradun

Figure 7: Herbarium Submitted in B.S.I, Dehradun & Authentication Certificate of B.S.I, Dehradun

Genuine sample of Odisha S(1_a)

Genuine sample of Uttarakhand S(1_b)

Figure 8: Genuine Samples

Genuine Samples

Table 1

Sample code	Place of collection	Date of collection	Collector
S _(1a)	Satakoshia forest, Dist-Mayurbhanj, Odisha	26/12/2015	Scholar
S _(1b)	Lachiwala, Dehradun, Uttarakhand	17/11/2015	Guide, Co- Guide & Scholar

Market Sample of Delhi S(2)

Market Sample of Haridwar S(3)

Market Sample of Jaipur S(4)

Market Sample of Odisha S(5)

Figure 9: Collection of the market sample

Collection of the market sample (Figure 9)

The collected market samples were coded as given below.

- 1- Market sample of **Khari-Babli bazaar, New Delhi**. Coded as S₍₂₎
- 2- Market sample of **Haridwar, Uttarakhand**. Coded as S₍₃₎
- 3- Market sample of **Jaipur, Rajasthan**. Coded as S₍₄₎
- 4- Market sample of **Bhubaneswar, Odisha**. Coded as S₍₅₎

Following points were kept in mind during collection of market samples

- Markets samples were collected as such and not verified/discussed on spot.
- Sample purchased were properly collected, labelled, stored and subjected to evaluation.

Market Samples

Table 2

Sample Code	Market	Date of Purchasing	Collector	Price/ kg
S ₍₂₎	New Delhi	07-09-2015	Scholar	Rs 250/kg
S ₍₃₎	Haridwar	04-10-2015	Scholar	Rs 300/kg
S ₍₄₎	Jaipur	10-12-2015	Scholar	Rs 280/kg
S ₍₅₎	Bhubaneswar	20-10-2015	Scholar	Rs 240/kg

RESULTS

Table 3: Comparative Organoleptic study of Gajapippali fruit as per API standards and genuine samples.⁶

Parameters	As per API	Genuine sample S _(1a) & S _(1b)
Size and Shape	Occurs in transversely cut circular pieces of about 2.0-3.0 cm in diameter and 2.0 – 3.5 cm in thick, cut surface has a central core, surrounded by fruits enclosing the seed covered by aril.	Straight, Cylindrical, Tapering towards the end, 10-15 cm long and 4-5 cm diameter.
Surface	rough and scaly	rough and scaly
Colour	Brownish grey	Dark green to Dark grey
Odour	Not distinct	Not distinct
Taste	Not distinct	Not distinct and pricking sensation on the tongue.
Fracture	Not mentioned	Incomplete

Table 4: Comparative organoleptic study on genuine and market sample of “Gajapippali” fruit

Organoleptic parameters	S _(1a) & S _(1b) (Genuine sample)	S ₍₂₎ (New Delhi)	S ₍₃₎ (Haridwar)	S ₍₄₎ (Jaipur)	S ₍₅₎ (Odisha)
Appearance	Straight	Woody, Curved & Twisted	Woody & Curved	Woody & Curved	Soft & Brittle
Surface	Smooth/Rough & Scaly	Rough & Wrinkle	Rough & Wrinkle	Rough & Black scales present	Rough & Black scales present
Size	10-15cm long, 4-5cm diameter	12-15cm long, 1-2.5cm diameter.	15-20cm long, 1-3cm diameter	12-15cm long, 1-2.5cm diameter	1-3cm long & 1-2cm diameter
Shape	Cylindrical, Tapering towards the end.	Cylindrical	Cylindrical	Cylindrical & Both end spherical	Cylindrical, Conical & Spherical pieces
Colour	Dark green to Dark grey	Dark black to Dark brown	Dark black to Dark brown	Black-Brown	Grey to black
Odour	Indistinct	Indistinct	Indistinct	Indistinct	Indistinct
Taste	Indistinct & Pricking sensation on the tongue.	Indistinct	Indistinct	Indistinct	Indistinct
Fracture	Incomplete	Short	Short	Short	Short & Smooth.

Table 5: Comparative Microscopic study of genuine sample, market samples and standards as per API of Gajapippali fruit⁷

Component	According to API	Work done by scholar		
****	*****	S _(1a) (Genuine Sample)	S ₍₃₎ (Haridwar)	S ₍₄₎ (Jaipur)
Fruit	Parenchymatous cells having iso-diametric cells filled with brown contents and crystals of calcium oxalates.	Seed Coat: contain thick cells and outer zone of sarcotesta.	Not present	Not present
Seed	Single layered, oval to polygonal, thin walled testa and irregular parenchymatous cells containing oil globules and aleurone grains.	Inner seed coat contains parenchymatous sarcotesta.	Large numbers of longitudinal parenchymatous cells are present and few sclerenchyma cells are found.	Large numbers of longitudinal parenchymatous cells are present and few sclerenchyma cells are found.
Vascular bundles	Not mentioned	Collateral and have wide rectangular block of phloem and a few parallel rows of angular thick walled xylem elements.	Scattered vascular bundles, Xylem cells are covered with cambium, 1 or 2 layers of phloem cells are present.	Scattered vascular bundles, Xylem cells are covered with cambium, 1 or 2 layers of phloem cells are present.
Endosperm	Not mentioned	Endosperm is cellular types which are elongated polyhedral with thin walls and dense starch grains.	Not present	Not present

T.S. of Genuine Sample (*Scindapsus officinalis* Schott) S_(1a)

Microscopic sections were cut by Microtome sectioning. Numerous temporary and permanent mounts of the microscopical sections of the specimen were cut and examined. Histochemical reactions were applied with staining reagents on transverse sections.⁸ (Figure 10)

T.S. of Market Samples (Figure 11)**Microscopy: Genuine Sample S_(1a)**

The seed coat consisting of thick cells and consists of outer zone of sarcotesta where the cells are angular and parenchymatous with thin walls. Inner seed coat with parenchymatous sarcotesta is a thin dark region. Vascular bundles are collateral and have wide rectangular block of phloem and a few parallel rows of

angular thick walled xylem elements. The endosperm is cellular types which are elongated polyhedral with thin walls and dense starch grains.

Market Samples S₍₃₎ and S₍₄₎ - Large number of longitudinal parenchymatous cell are found in seeds, few sclerenchyma cells are found. Scattered vascular bundles, Xylem cells are covered with cambium, 1 or 2 layers of phloem cells are present.

Powder microscopy

Preliminary examination of Powder characteristics and behaviour of the powder with different chemical reagents was carried out and microscopically examination was carried out as per reported methods.⁹

Table 6

Stain	S _(1a) (Genuine)	S ₍₃₎ (Haridwar)	S ₍₄₎ (Jaipur)
Dil. Ferric Chloride Solution stain	Green colour shows Tannins	*****	*****
Iodine Solution stain	Violet colour shows Starch Pale yellow colour shows Cellulose	Violet Colour shows Starch Pale yellow Colour shows Cellulose	Violet Colour shows Starch Pale yellow Colour shows Cellulose
Sulphuric Acid 66 % stain	Needle shaped crystals shows Calcium Sulphate	Needle Shaped Crystals shows Calcium Sulphate	Needle Shaped Crystals shows Calcium Sulphate
Methylene Blue stain	Deep blue colour shows Mucilage	Deep Blue Colour of Mucilage	Deep Blue Colour of Mucilage
Iodine Solution + Sulphuric Acid stain	Violet Colour shows Chitin	*****	*****
Sudan III stain	Red Colour shows Cutin	*****	*****
Saffranin stain	Red Colour shows cell nuclei	Red Colour of cell nuclei	Red Colour of cell nuclei

Sec- Seeds Coat
MC- Mesocarp
SC- Sclerenchyma cells

SG- Starch grains
VB- Vascular bundle

ISC- Inner seed coat
ST- Sarcotesta
OS- Ostiole (passage of the ovule)

Figure 10: T.S. of Genuine Sample (*Scindapsus officinalis* Schott) S1 (a)

SC-sclerenchyma cells

Pr- parenchymatous
Vb- Vascular bundle

S₍₃₎

SC-sclerenchyma cells

Pr- parenchymatous
Vb- Vascular bundle

Figure 11: T.S. of Market Samples S₍₄₎

Green colour of Tannins
(Stain: Dil. Ferric Chloride Solution)

Violet Colour of Starch
(Stain: Iodine Solution)

Needle Shaped Crystals of Calcium Sulphate
(Stain: Sulphuric Acid 66 %)

Pale yellow Colour of Cellulose
(Stain: Iodine Solution)

Deep Blue Colour of Mucilage
(Stain: Methylene Blue)

Violet Colour of Chitin
(Stain: Iodine Solution + Sulphuric Acid)

Red Colour of Cutin
(Stain: Sudan III)

Red Colour of cell nuclei
(Stain: Saffranin)

Figure 12: Powder Microscopy of Genuine sample S_(1a)

Shaped Crystals of Calcium Sulphate
(Stain: Sulphuric Acid 66 %)

Violet Colour of Starch
(Stain: Iodine Solution)

Deep Blue Colour of Mucilage
(Stain: Methylene Blue)

Pale yellow Colour of Cellulose
(Stain: Iodine Solution)

Red Colour of cell nuclei
(Stain: Saffarinin)

Market Sample S₍₃₎

Needle Shaped Crystals of Calcium Sulphate
(Stain: Sulphuric Acid 66 %)

Violet Colour of Starch
Stain: Iodine Solution

Deep Blue Colour of Mucilage
(Stain: Methylene Blue)

Pale yellow Colour of Cellulose
(Stain: Iodine Solution)

Red Colour of cell nuclei
(Stain: Saffarinin)

Figure 13: Powder Microscopy of Market Sample S₍₄₎

Powder Microscopy of Genuine sample S_(1a) (Figure 12)

Powder Microscopy of Market Sample S₍₃₎ (Figure 13)

Market Sample S₍₄₎ (Figure 13)

Dry powder of genuine sample S_(1a) have Tannins, Starch, Calcium Sulphate, Cellulose, Mucilage, Chitin, Cutin, Nuclei Cell are Present.

Dry powder of market sample S₍₃₎ and S₍₄₎ have Starch, Calcium Sulphate, Cellulose, Mucilage, Nuclei Cell are Present. Tannins, Chitin and Cutin was absent in Market samples S₍₃₎ & S₍₄₎.

DISCUSSION

The Ayurvedic community discuss on various controversies over identification of authentic source of drug only on the bases of literary survey, without any serious engagement in field & market survey or without scientific standardization of raw drugs. An adulteration or passing off of substandard drugs is possible only when the consumers are not aware of identity of products, they utilise. The Present study of Gajapippali, (*scindapsus officinalis* Schott.) is a step to make a database to identify the original medicinal plant like Gajapippali.

1. Gajapippali is a pretty big creeper found almost in the tropical & sub tropical sal forest belonging to family Araceae.¹⁰
2. The fruits of chavya have been told as Gajapippali by Bhav Mishra.¹¹
3. In API the fruit of *Scindapsus officinalis* Schott has been mentioned as Gajapippali.¹²
4. In AFI, Formulary of single drug (Part-B) has mentioned 1048 single drug plant. In Sl. No-324 Gajopkulya, Official name- Gajapippali, *Scindapsus officinalis* Schott has been mentioned.¹³
5. According to the text book "Some Controversial Drugs in Indian Medicine" of Dr. Bapalal Vaidya the mastak-majja/male spadix of Taad tree (*Borassus flabellifer* Linn.) are cut in to small pieces and being sold as Gajapippali in different major markets of India.¹⁴
6. It is observed by guide, co-guide and Scholar himself that in some part of India especially in Haridwar the fruit of *Monstera deliciosa* Liebm. Or fruit salad tree (In reference to its edible fruit) are also being used as Gajapippali.
7. After analysis of all market samples, the departmental faculty of Dravyaguna vijnana, Rishikul campus, Haridwar decided that all the market samples appears to be the male spadix of Palm tree (*Borassus flabellifer* Linn.) except the market sample of Odisha which was similar with genuine sample.

CONCLUSION

After analyzing and comparing the organoleptic characters of sample of Gajapippali brought from the market of Delhi, Haridwar, Jaipur, Odisha with the genuine sample, which was collected from its native place, it was found that all the market samples did not exactly match with the genuine sample, either

organoleptically or microscopically (On the basis of T.S. and Powder microscopy). Only the market sample of Odisha exactly matched with the genuine sample of Gajapippali. During pharmacognostical (microscopic and organoleptic) studies it is found that in market of Delhi, Haridwar & Jaipur the Male spadix of *Borassus flabellifer* Linn. is being adulterated in place of genuine drug Gajapippali. So, the present study is an attempt to find out potential measures such as identification & pharmacognostical study of *Gajapippali*, So that coming generation do not get confused about its identification.

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