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## A Comparative Pharmacognostical and Physico-chemical study of *Patola* (*Trichosanthes cucumerina* Roxb.) Leaves Collected from Field and Market

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### ABSTRACT

**AIM** - To analyze samples collected from field and market sample of *Patola* leaves (*Trichosanthes cucumerina* Roxb.) based on Pharmacognocoy and Physico- chemistry.

**MATERIALS & METHODS:** - It is an analytical study. In present study Collection, Procurement, Authentication, Panchabhautik parikshan, preparation, foreign matter, Moisture content, Total ash, Extractive study, HPTLC etc. were determined for pharmacological and physicochemical evaluation of samples collected from field and market.

**OBSERVATIONS AND RESULTS:** - Pharmacognostically and physicochemicaly, the collected samples of *T.cucumerina* are different from each other.

**CONCLUSION:** - The chemical constituents of collected samples were nearly same but in panchabhautik examination both are different. *T. Cucumerina*, it should be used in medicine being more *tikta* with all parts and *T.dioica* and *T.aguina* should be used in diet as *pathya shaka*.

### KEYWORDS

*T. cucumerina*, *Patola* leaves, *Pharmacognostical*, *Physico-chemical*



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## INTRODUCTION

Ayurvedic medicines are always in discussion of ambiguity. In present scenario, many drugs get adulterated due to high demand of drug, endangered species, seasonal plants, etc. In day-to-day life medicinal plants are get collected from vendors and not from Vaidya's from field which affects identification of plant, so drugs which are collected from vendors will not be authentic due to incorrect identification and which results in controversy. So, outcome of result from patients get affected due to adulteration.

Present study was aimed to carry out on *T. cucumerina*, to rule out adulteration, controversy from field and market. The purpose to select this plant is, in classical review drug Patola is described in two types. As per Vaghabhatta – Patola, Patoli (*Trichosanthe dioica* Roxb), *T. cucumerina* Linn. is also known as “vana Patola, Tikta Patola”. In Bhavprakash nighantu, mentioned two varieties of patola “Swadu” and “Tikta patola.”<sup>1</sup>

*T. cucumerina* belongs to Cucurbitaceae family, which is an annual climber. It is highly bitter in taste and is being known to contain wide range of medicinal properties. All the parts are being used as medicine<sup>2</sup>.

In India there are several species of *Trichosanthes* like *T. dioica*, *T. cucumerina*, *T. aguina*, *T. palmata*, *T.*

*bracteata*, *T. wallichi* etc. In these species *T. doica*, *T. aguina* are used for vegetable. *T. cucumerina*, *T. bracteata* which are bitter in taste and used for medicinal purpose.

*T. dioica* gets cultivated in plains of Punjab to Assam which is edible. *T. cucumerina* is wild species which gets in South India region abundantly but rarely in North India. In present study field sample was collected from Maharashtra region and market sample was collected from North India region to compare.

Most useful parts of this species are leaf but the work on the pharmacological studies were done rarely on leaf. There is no work carried out on this species according to pharmacognostical and physicochemical aspect. So, there is need to evaluate the adulteration and substitute of *T. cucumerina* in market.

## MATERIAL AND METHODS

### COLLECTION OF SAMPLES

The genuine sample was collected from Tal. Khultabad Dist. Aurangabad Maharashtra in *Sharad Ritu* (June to October) i.e. flowering and fruiting season (**Image 1**). The market sample was collected from Varanasi Uttar Pradesh in *Sharad Ritu* i.e. (June to October.)<sup>3</sup> (**Image 2**)

### AUTHENTICATION OF SAMPLE



The samples were authenticated from the B S I, Pune.



**Image 1-** Collected field sample **Image 2-** Collected Market Sample

### PREPARATION OF THE SAMPLES

Samples of *Patola* were collected, foreign matters i.e. extraneous matter was removed. Leaves are separated from stem, well dried under shadow. In market sample foreign matter as sticks, feather, other plants leave, etc. were removed.

### PANCHBHOUTIK PARIKSHAN (ORGANOLEPTIC STUDY)

**Table 1** *Panchbhautik Patikshan*

Characters	Field Sample	Market sample	
<b>Shabda (Fracture)</b>	Short	Short	
<b>Sparsh (Touch)</b>	<i>Alpa Khar</i>	<i>Khar</i>	
<b>Roop (Shapes)</b>	Palmatifid	Cordate	
<b>Colour</b>	<b>Upper S.</b>	Dark Green	Yellowish Green
	<b>Lower S.</b>	Greenish White	Greenish White
<b>Rasa (Taste)</b>	<i>Tikta</i>	<i>Tikta</i>	
<b>Gandha (Odour)</b>	Non-Specific	Non-Specific	

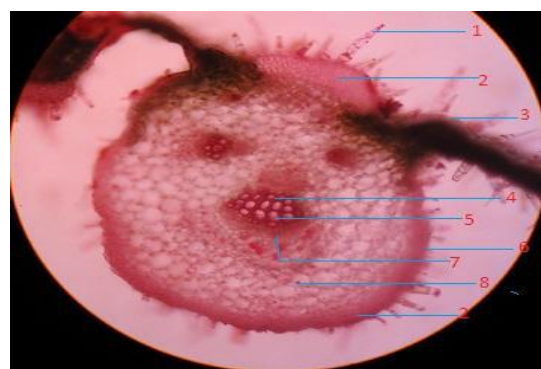
### PHYSICO-CHEMICAL ANALYSIS

In physicochemical analysis moisture content (loss on drying), ash values, elemental ash analysis, extractive values, fluorescence analysis and high-performance thin layer chromatography

(HPTLC) tests were carried out as per standard protocol.

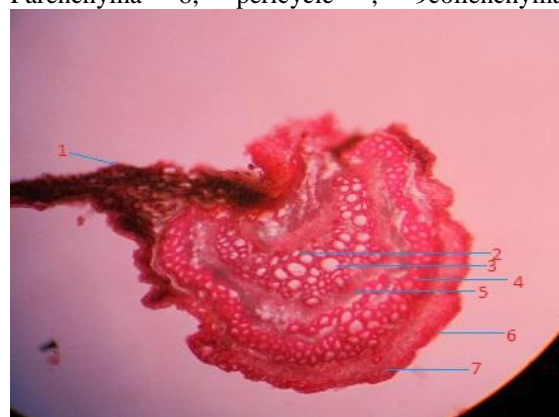
### OBSERVATIONS AND RESULTS MICROSCOPY

In microscopy of both samples the cell structures like upper epidermis, lower epidermis, vascular bundles, parenchymatous cell, collenchyma cells are nearly same the differences are as- (Image 3) (Image 4)



**Image 3-** Microscopy of Field Sample

1 Trichomes, 2 Upper epidermis, 3 Metaxylem, 4 Protoxylem, 5 Lower epidermis, 6 Phloem, 7 Parenchyma 8, pericycle, 9 collenchyma



**Image 4-** Microscopy of Market Sample

1 Upper epidermis, 2 Metaxylem, 3 Protoxylem, 4 Pericycle, 5 Phloem, 6 Lower epidermis, 7 chollenchyma

**1 Covering trichomes-** in field sample epidermis is tangentially elongated





covering trichomes 1-2 celled but in market sample epidermis are tangentially

Sample	Field Sample	Market sample
Copper	-ve	-ve
Magnesium	+ve	+ve
Chlorine	+ve	+ve
Sulpher	+ve	+ve
Pottasium	-ve	+ve

elongated covering trichomes 2-5 celled.

**2 Pericycle cells-** in field sample a below of vascular bundle the phloem cells were seen. Below the lower phloem cells, the pericycle cells were present but in market sample pericycle cells were not present.

### POWDER MICROSCOPY

To study the presence or absence of various types of tissues or structures, the shade dried leaves are powdered using electric grinder, passed through sieve no. 60, and then subjected for microscopic studies. The findings are as mentioned in table no 2.

**Table 2** Powder Microscopy

Sample Findings	Field Sample	Market sample
Stomata	+	+
Crystals/ calcium oxalate	+	+
Trichomes	+	+
Epidermal cells	+	+
Vascular Bundles	-	+
Phloem Fibers	+	-
Veinlets	-	+

### PHYSICO-CHEMICAL STUDY

In physico chemical study the results of both samples are nearly same as shown in table no 3.

**Table 3** Physico-chemical study

Parameters	Field Sample	Market sample	API Values
Foreign matter %	-	1gm	-
Moisture %	8.41	8.37	-
Total ash %	18.76	20.04	-
Aqueous Soluble Extract %	14.63	14.74	-
Alcohol Soluble Extract %	5.34	6.24	-

### ELEMENTAL ASH ANALYSIS

In Elemental ash analysis potassium is present in market sample rest findings are same as shown in table no 4.

**Table 4** Elemental ash analysis

### pH OF AQUEOUS EXTRACT

pH of both samples are nearly same as shown in table no 5.

**Table 5** pH of aqueous extract

Samples	Ph of Aqueous Extract
Field Sample	7.70
Market sample	7.66

### SPECIFIC GRAVITY OF AQUEOUS EXTRACT

Specific gravity of aqueous extract of both samples are nearly same as shown in table no 6.

**Table 6** Specific gravity of aqueous extract

Samples	Specific Gravity
Field Sample	1.00467
Market sample	1.0012

### MICRO CHEMICAL TESTING OF AQUEOUS AND ALCOHOL EXTRACT

In microchemical study amino acids and alkaloids are absent in aqueous extract in both samples, whereas glycosides, carbohydrates and saponin are absent in both samples as shown in table no 7.



**Table 7** Microchemical testing

Test performed	Reagents used	Aqueous extract of Field sample	Aqueous extract of Market sample	Alcohol extract of Field sample	Alcohol extract of Market sample
Alkaloids	Hager's	-Ve	-Ve	+Ve	+Ve
Glycosides	Mollisch	+Ve	+Ve	-Ve	-Ve
carbohydrates	Mollisch	+Ve	+Ve	-Ve	-Ve
Phytosteron	10% lead acetate	+Ve	+Ve	+Ve	+Ve
Saponin	Distilled water	+Ve	+Ve	-Ve	-Ve
Phenolics	Ferric chloride	+Ve	+Ve	+Ve	+Ve
Tanin	Ferric chloride	+Ve	+Ve	+Ve	+Ve
Protiens	Millon's	+Ve	+Ve	+Ve	+Ve
Amino acids	Ninhydrin	-Ve	-Ve	+Ve	+Ve
Reducing sugar	Benedict	+Ve	+Ve	+Ve	+Ve
Starch	Iodine	+Ve	+Ve	+Ve	+Ve

### FLUORESCENCE ANALYSIS OF AQUEOUS EXTRACT

In fluorescence analysis under 245 band, field sample is visualized as green colored non fluorescence but in market sample it is

visualized light green colored non fluorescence and under 365 band dark yellow fluorescence visualized in both samples. As shown in table no 8.

**Table 8** Fluorescence analysis

Tests	Field Sample			Market Sample		
	Visual	245	365	Visual	245	365
Extract + Alcohol	Yellow	Green NF	Dark Yellow FL	Yellow	Light Green NF	Dark Yellow FL
Extract + Ethyl acetate	Yellow	Green NF	Dark Yellow FL	Yellow	Light Green NF	Dark Yellow FL
Extract + Benzene	Yellow	Green NF	Dark Yellow FL	Yellow	Light Green NF	Dark Yellow FL
Extract + Methanol	Yellow	Green NF	Dark Yellow FL	Yellow	Light Green NF	Dark Yellow FL
Extract + Fluoroglucinol	Yellow	Green NF	Dark Yellow FL	Yellow	Light Green NF	Dark Yellow FL
Extract + pet ether	Yellow	Green NF	Dark Yellow FL	Yellow	Light Green NF	Dark Yellow FL

### CROMATOGRAPHIC (HPTLC) STUDY

In chromatographic study samples shows similarity in R<sub>f</sub> value at 5µl, whereas at 10µl values are variable. As shown in table no 9.

			nm	nm
1	Field 5 µl	0.2	11996	11550
		0.92	31424	4851
2	Field 10 µl	0.2	17408	17239
		0.92	15820	5079
3	Market 5µl	0.2	14551	13171
		0.88	23326	4400
4	Market 10µl	0.2	19434	20955
		0.88	20984	5339

**Table 9** Chromatographic study

Sr. No.	Sample	R <sub>f</sub> Value	Area at 254	Area at 366
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### DISCUSSION



There are no classical references of the drug *Patola* in Vedic period, but many references are available in *Samhitas period*.

In Bhavprakash nighantu, patola is mentioned as of two varieties, swadu and tikta patola. According to Vd. P.V. Sharma and Vd. K. C. Chuneekar shastri the authentic source of *Patola* is *T.dioica Roxb.* (4), *Vana /Tikta Patola is T.cucumerina Linn.*, is used in South India as Patola for medicinal purpose, which is bitter in taste.

For the present study the leaves collected from field and market.” were assessed to find the controversies and adulteration between the different species of *Trichosanthes*, which is used in medicine.

In pharmacognostical study, it is observed that the market and field samples are different, the market sample shows resemblance of *T. doica*. No standard values (i.e. API Values) were not found to compare the observed values. In physico chemical study readings of field and market samples are nearly same but in chromatographic study samples, shows similarity in Rf value at 5 µl, whereas at 10µl values are variable.

#### **SUBSTITUTES AND ADULTERANTS**

*T.cucumerina* and *T. Dioica*, *T. aguina* are used under the name of *Tikta Patola* and *Swadu Patola* respectively. Other species of *Trichosanthes* which shows similarity in morphological characters hence added as

adulterants which are *T. palmata*, *T. cordata*, *T. cucumerina*.

#### **CONCLUSION**

The chemical constituents of collected samples are nearly same but in panchabhautik examination both are different. *T. Cucumerina*, it should be used in medicine being more *tikta* with all parts and *T.dioica* and *T.aguina* should be used in diet as *pathya shaka*.



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