



PHYTO-PHARMACOGNOSTICAL STUDIES OF *MEDA* [*POLYGONATUM VERTICILLATUM* LINN.], *MAHAMEDA* [*POLYGONATUM CIRRHIFOLIUM ROYLE*] AND THEIR MARKET SAMPLE

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ABSTRACT

Indian *Astavarga* constitutes eight miracle plant species, used for rejuvenating purpose. *Meda* and *Mahameda* are well known as members of *Astavarga*, belong to Garhwal Himalaya, having high therapeutic potential for fighting against several diseases. In present status, due to over exploitation, these species become vulnerable or endangered. *Meda* and *Mahameda* are described with their various formulations and indications in *Samhita & Chikitsa grantha*, having admiring properties like *Jivaniya & Vayasthapana* and play a major role in strengthening immune system to fight against diseases. Both the plants belong to "Asperagaceae" family. In present study, all aspects about *Meda*, *Mahameda* have been taken like name, geographical source, Macroscopy, Microscopy, Physicochemical, Phytochemical (Qualitative & Quantitative) & Chromatographic activities. For knowing current market status, market sample (S3) was procured in the name of authentic drugs. In Phytochemical study, on the basis of quantitative analysis Alkaloids, Bitter content, Saponins, Total Tannins, Flavonoids, Polyphenolic content were estimated. Alkaloid value - 1.20%w/w, Saponin value - 20.63%w/w, Polyphenolic content-172.04 mg/100gm for *Meda* was maximum. Total Tannins-493.20mg/100gm, Flavonoid- 124.46mg/100gm for *Mahameda* was maximum. A good percentage of Bitter content was found in market sample (S3) -14.48%w/w. In Physicochemical analysis Aqueous extractive value of all these samples was maximum in comparison to Alcohol extractive value. All these parameters will help in confirming identity, quality, purity, potency, safety and efficacy of these plants.

KEYWORDS: *Meda*, *Mahameda*, Alkaloid, Saponin, Tannin, Polyphenolic content, Flavonoid.

INTRODUCTION

Ayurveda is one of the most acclaimed traditional systems of medicine that has survived and developed from ages till date. The creator of the universe passed on this holistic knowledge of healing to the sages for the prosperity of mankind. This ancient system of healing is believed to be based on four renowned compilation of knowledge (Vedas). After vedic period, many well known books have written, known as samhitas. In Charak samhita^[1] *Meda*, *Mahameda* are included in *Jivanya mahakashya*. Similiary *Sukrajanana mahakashya* and *Snehopag mahakashya* consists of *Meda*. In *Sushruta samhita*^[2] both are included in *Kakoliyadi gana*. These drugs having admiring properties like *Jivaniya & Vayasthaphan* comparable to nutritive, anti-aging & anti-oxidant properties of modern pharmacology. Various vernacular name and synonyms mentioned in *Nighantus* describe properties, morphological characters but also create confusion. Unfortunately lack of authentic

knowledge has led to controversies over the identity of many medicinal plants. Hence the need of the hour is to establish parameters about their standardization. Also India is renowned for huge collection of medicinal plants. Day by day increasing demand of herbs has led to destruction of the forest to such an extent that many plants has abolished totally or have entered into the endangered. So present urgency is to show the importance of these 2 plants which is helpful in their culturing & conservation.

Collection of Herbs

Collection of these plants from Uttarakhand region has done by the scholar himself because their biological place is already given in *Bhavprakash nighantu*^[3] as "*Morangado prajayetae*" (South east Nepal) for *Meda* and *Mahameda*. *Meda* and *Mahameda*, both plants found at high altitude of range 1500-3300m. But *Meda* is found in higher percentage in comparison to *Mahameda*. The

authentication of these four plants has been done at B.S.I, Dehradun. For the research work scholar has also visited market place just to know what is presently commercially available in the name of these drugs and procured sample in the name of *Meda & Mahameda*. Pharmacognosy of these plants has been done so that no confusion will present regarding their identification.

1. *Polygonatum verticillatum* Linn

Synonyms^[4]: *Convallaria leptophylla* D.Don, *Convallaria stellifolia* Peterm., *Polygonatum erythrocarpum* Hua., *Polygonatum jacquemontianum* Kunth.

Vernacular names^[5,6]

Hindi, Marathi, Telugu, Tamil, Gujrati, Bengali, Oriya, Punjabi,

Mal.: *Meda*

English: *Meda*

Kannada: *Medha*

Sanskrit: *Meda*

Taxonomical Position^[7]

Kingdom : Plantae
Phylum : Tracheophyta
Class : Liliopsida
Order : Asparagales
Family : Asparagaceae
Sub family: Nolinoideae
Genus : Polygonatum
Species : Verticillatum

Ayurvedic Properties^[8]

Rasa : *Madhura (Sweet)*

Guna : *Guru (Heavy)*

Virya : *Sheet (Cold)*

Vipaka : *Madhura (Sweet)*

Dosha karma: Vata-pitta shamak, Stanyakar, Sukrakar, Kapha vardhak, Brmhana, Snigdha, Medavardhak, Jivaniya, Sukrajanana, Rajayakshma, Jvara, Ksaya, Raktapitta, Daha and Kasashamak.

2. *Polygonatum cirrhifolium* Royle

Synonyms^[9]: *Convallaria cirrhifolia* Wall., *Polygonatum bulbosum* H.Lév., *Polygonatum cirrhifolios* D.M.Liu & W.Z.Zeng, *Polygonatum fargesii* Hua.

Vernacular names^[10,11,12]

Hindi, Telugu, Tamil, Gujarati, Mal: Mahameda

English : Tendril leaf solomon's seal.

Kannada : Mahamedha

Nepali : Ramsikiya

Sanskrit : *Mahameda, Vasucchidra, Tridanti, Devamani.*

Details of Market Samples

S.No.	Markets	Date of Purchasing or receiving	Collector	Price of the sample
1.	Delhi	16/09/2017	Scholar	<i>Meda-Mahameda</i> : Rs.400/-Kg

Taxonomical Position^[13]

Kingdom : Plantae
Phylum : Tracheophyta
Class : Liliopsida
Order : Asparagales
Family : Asparagaceae
Sub family : Nolinoideae
Genus : Polygonatum
Species : Cirrhifolium

Ayurvedic Properties^[14]

Rasa : *Madhura (Sweet)*

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Dosha karma : Vata-pitta shamak, Stanyavardhak, Vrsya, Sukrakar, Kapha vardhak, Brmhana, Snigdha, Medavardhak, Jivaniya, Sukrajanana, Jvara, Ksaya, Raktapitta, Daha and Kasashamak.

MATERIAL AND METHODS

Material

The plant materials taken for the study were

- Genuine and market samples of *Meda- Polygonatum verticillatum* (Linn.)
- Genuine and market samples of *Mahameda - Polygonatum cirrhifolium* Royle.

Collection of genuine sample

- The genuine sample of *Meda* i.e. *Polygonatum verticillatum* (Linn.) has collected from Valley of flower, district- Chamoli and Chopta, district- Rudraprayag, State –Uttarakhand.

Date of Collection : 20-07-2017

Geographical details of Habitat

- **Valley of flower, Uttarakhand** (15 km from Govind Ghat) - At an altitude of 11,600 feet Approx. above sea level.
- **Chopta, Uttarakhand** (24 km from Rudraprayag) - At an altitude of 8,790 feet Approx. above sea level.
- The genuine sample of *Mahameda* i.e. *Polygonatum cirrhifolium* Royle has collected from Valley of flower, district- Chamoli, State –Uttarakhand.

Date of Collection : 5-07-2017

Geographical details of Habitat

- **Valley of flower, Uttarakhand** (15 km from Govind Ghat) - At an altitude of 11,600 feet Approx. above sea level.

Other Materials

- Magnifying Lens, measuring tape for organoleptic study.
- Safranin, Eosin, Ferric chloride, Naphthol, Iodine, Sudan red III and Ethanol for staining and Canon digital camera attached to Zeiss microscope was used for the microscopic study.

Methods**Herbarium and authentication of collected genuine plant material**

S.No	Name of the plant	Time of Collection	Place of Collection	Authentication of Herbarium
1.	<i>Meda: Polygonatum verticillatum</i> (Linn.)	July, 2017	Valley of flower, <i>district:</i> Chamoli and Chopta, <i>district:</i> Rudraprayag,	BSI, Dehradun
2.	<i>Mahameda: Polygonatum cirrhifolium</i> Royle	July, 2017	Valley of flower, <i>district:</i> Chamoli, Gangotri forest region.	BSI, Dehradun

Labeling of all Samples

Genuine sample of <i>Meda</i>	S1
Genuine sample of <i>Mahameda</i>	S2
Sample of Delhi <i>Meda-Mahameda</i>	S3

OBSERVATION AND RESULTS**Pharmacognostical Study****Macroscopy**

Features	<i>Polygonatum verticillatum</i> (Linn.)	<i>Polygonatum cirrhifolium</i> (Wall.)
Habitat	Temperate Himalayas, in India Himanchal pradesh, Uttrakhand, J&k etc.	Temperate Himalayas, in India Himanchal pradesh, Uttrakhand, J&k etc.
Stem	Erect, tall, angled, slender.	Long, weak, flexuous, terete.
Leaves	Whorls of usually 4-5, sessile, 7-15 cm long, 0.5-2.5 cm broad, lanceolate, tip acute.	Whorls of 3-6, 8-13 cm long, 3-6 mm broad, tip of leaves tendril like, narrow.
Flowers	In whorls of 2-5 flowered axillary raceme, 6-9 mm long, white-greenish.	2-4 flowered peduncle, 5 mm in diameter, pendulous, white-yellowish.
Fruit	5-7 mm in diameter, berries, green when immature, orange-red when ripe.	6-7 mm in diameter, berries, green when immature, orange-red when ripe
Rhizome	Thick ginger like, 4-6 cm long, 1-2 cm thick, dull white in colour.	Moniliform like ginger, dull white-pale in colour, 3-5 cm long, 0.5-2 cm thick.

- **Organoleptic Study- Comparative Organoleptic features of *Meda*, *Mahameda* & Market sample.**

Character	Rhizome of <i>Meda P.verticillatum</i> Linn.	Rhizome of <i>Mahameda P.cirrhifolium</i> Wall.	Market sample (<i>Meda-Mahameda</i>)
Shape	Thick irregular, tuberous, Knotty, laterally compressed bearing short flat, ovate & oblique branch having bud.	Moniliform or tuberous terete, irregular compressed shaped.	Thick irregular, laterally compressed.
Size	4-6 cm long, 1-2cm thick.	3-5 cm long, 0.5-2 cm thick.	4-5 cm long, 1-2 cm thick.
Surface	Fresh rhizome- Smooth. Longitudinally wrinkled when dried, marked with encircling leaf scars and many root scars on the surface.	Fresh rhizome- Smooth. Rough surface with irregular wrinkled when dried, root and leaf scars on the surface.	Longitudinally wrinkled, marked with encircling leaf scars and many root scars on the surface.
Odour	odourless	Odourless	Odourless
Colour	Reddish-brown	Light brown	Reddish-brown
Taste	Sweet with slight bitter	Sweet with slight bitter	Sweet with slight bitter
Fracture	Fibrous, internally deep reddish-brown.	Fibrous, brown waxy interior.	Internally hard texture with deep reddish -brown.

1. Transverse section microscopic study

- Comparison of the features seen in the Transverse section of *Meda*, *Mahameda* & Market sample.

Characters	Genuine Sample of <i>Meda</i>	Genuine Sample of <i>Mahameda</i>	Market Sample of <i>Meda-Mahameda</i>
Cork cell	8-10 layers with thick cuticularised outer wall.	1-2 layers with single layer cuticularized outer wall.	8-10 layers with thick cuticularised outer wall.
Cortex	Cells of the ground tissue small, loosely arranged, Parenchymatous cells.	parenchymatous cortex of polygonal to isodiametric cells.	Cells of the ground tissue small, loosely arranged, Parenchymatous cells.
Vascular bundle	Scattered, conjoint collateral arc shaped.	Scattered, Amphivasal.	Scattered, conjoint collateral arc shaped.
Endodermis	Not distinct	Not distinct	Not distinct

1. Powder Microscopy Study

- Comparison of the features seen in the Powder microscopy.

Features	<i>Meda</i>	<i>Mahameda</i>	Market sample
Cork cell	+	+	+
Xylem vessel	+	+	+
Stone cell	+	-	+
Starch grain	+	+	+
Parenchyma cells	+	+	+
Lignified cell	-	+	-
Mucilagenous cell	+	-	+
Trichomes	+	+	+
Alurone grain	+	-	+
Calcium oxalate crystals	+	-	+

1. Physicochemical Study

Test	Result				
	S1	S2	S3	API S1	API S2
Foreign matter	0 %	0 %	1.14 %	NMT 2%	NMT 3%
Moisture content	6.74 %	6.31 %	5.21 %	-	-
pH	4.82	5.06	4.36	-	-
Total Ash	3.82 %	2.97 %	4.70 %	NMT 5%	NMT 3.5%
Acid Insoluble Ash	0.81 %	0.47 %	1.73 %	NMT 1%	NMT 1%
Water Soluble Ash	1.13 %	1.23 %	0.98 %	-	-
Alcohol Extractive Value	27.2 %	9.62 %	18.81 %	NLT 25%	NLT 4.5%
Aqueous Extractive Value	65.0 %	73.12 %	48.07 %	NLT 62 %	NLT 70 %

2. Phytochemical Study

Qualitative Analysis

A. Carbohydrate test for different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Fehling Test	+ve	+ve	S1
	+ve	+ve	S2
	+ve	-ve	S3

B. Alkaloid analysis in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Mayer Reagent	+ve	+ve	S1
	+ve	+ve	S2
	+ve	+ve	S3

C. Analysis of Proteins in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Biuret Test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3

D. Analysis of Saponin in different Samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Foam Test	+ve	+ve	S1
	+ve	-ve	S2
	+ve	+ve	S3

E. Analysis of Glycosides in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Borntrager's Test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3

F. Analysis of Phenolic compounds in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Phenolic Test	+ve	+ve	S1
	+ve	+ve	S2
	+ve	+ve	S3

G. Analysis of Steroids in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Salkowski Reaction	+ve	+ve	S1
	+ve	-ve	S2
	+ve	+ve	S3

H. Analysis of Tannin in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Ferric Chloride Test	+ve	+ve	S1
	+ve	+ve	S2
	+ve	+ve	S3

I. Analysis of Starch in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Iodine Test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3

J. Analysis of Flavonoid in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Shinoda's Test	+ve	+ve	S1
	+ve	+ve	S2
	+ve	+ve	S3

K. Analysis of Terpenoid in different samples.

Name of test	Aqueous extract	Alcohol extract	Sample
Terpenoid Test	+ve	+ve	S1
	-ve	-ve	S2
	-ve	+ve	S3

Quantitative Analysis**A. Quantitative Analysis of *Meda, Mahameda & Market* sample.**

Quantitative value	(S1) %w/w	(S2) %w/w	(S3) %w/w
Alkaloids	1.20	0.78	0.50
Bitter content	12.67	8.01	14.48
Saponins	20.63	15.71	17.58

Quantitative value	(S1) mg/100gm.	(S2) mg/100gm.	(S3) mg/100gm.
Total Tannins	394.34	493.20	297.57
Flavonoid	108.45	124.46	87.46
Polyphenolic content	172.04	140.29	115.76

1. Chromatographic Study

TLC (Thin Layer Chromatography) analysis for different samples

Solvent system: chloroform : glacial acetic acid:methanol : water (50:20:20:10) –*Meda*

Solvent system: methanol : chloroform (3 : 7) – *Mahameda*.

Sample: Ethanol Extract

Visualization: On spraying with *anisaldehyde sulphuric acid reagent* and heating the plate for 10 minutes at 105° spots. (*Meda*)

On spraying with 10% sulphuric acid in ethyl alcohol and heating the plate for about 5 minute at 110°c. (*Mahameda*).

Samples	UV 365 nm		After Spraying/ Divertization	
	No. of spots	R _f Value	No. of spots	R _f Value
S1	3	0.54, 0.72, 0.84	4	0.44, 0.56, 0.74, 0.87
S2	3	0.24, 0.36, 0.52	3	0.30, 0.42, 0.66
S3	3	0.54, 0.72, 0.82	3	0.44, 0.56, 0.74

1. Macroscopic Characters of *Meda* & *Mahameda*.



Figure 1: *Meda*- *P.verticillatum* Linn. (Flowering)



Figure 2: *P.verticillatum* Linn. (Fructing).



Figure 3: *Mahameda P.cirrhifolium* Wall.



Figure 4 *Mahameda P.cirrhifolium* Wall. (Flowering).

2. Genuine & Procured Sample Of *Meda*, *Mahameda* & Market Samples For Organoleptic Study.



Figure 5 Genuine Sample of *Meda*.



Figure 6 Genuine Sample of *Mahameda*.



Figure 7: Market Sample in the name of *Meda-Mahameda*.

3. Transverse Section of *Meda*, *Mahameda* & Market Sample.

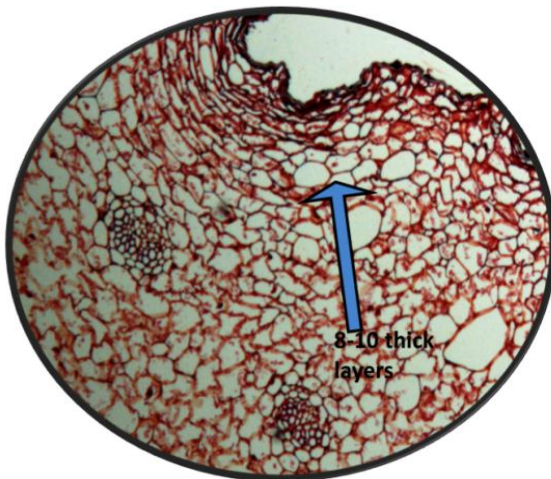


Figure 8: T.S of Rhizome of *P.verticillatum* (Linn.).

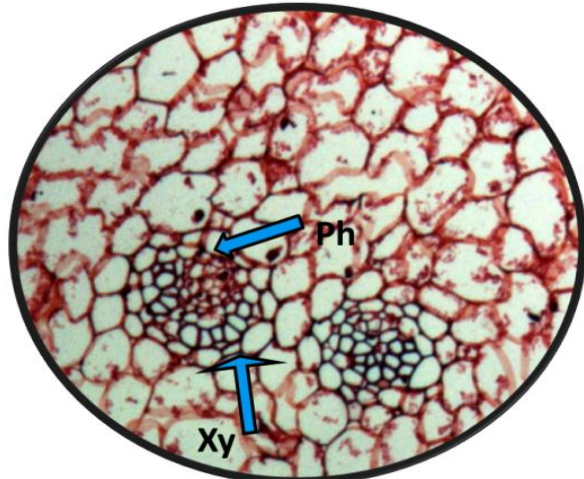


Figure 9: Vascular bundle of *P.Verticillatum* (Linn.).

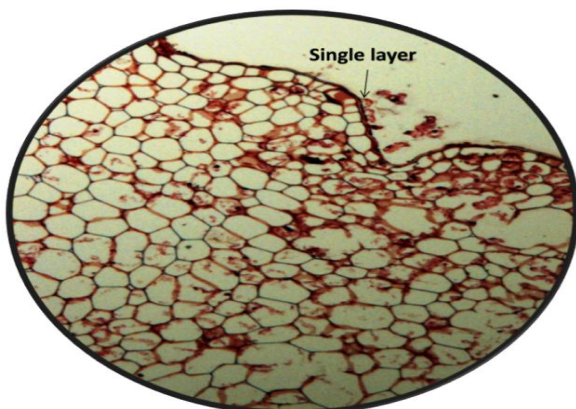


Figure 10: T.S Rhizome of *P.cirrhifolium* (Linn.).

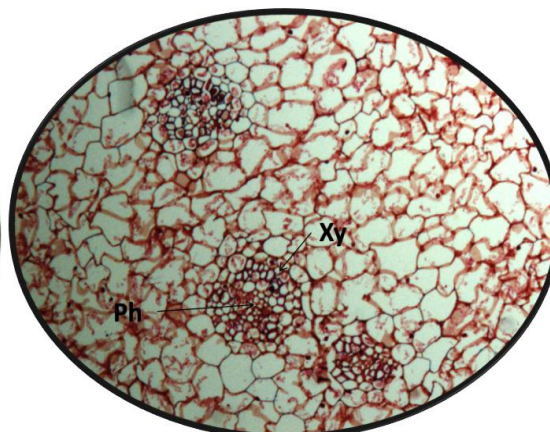


Figure 11: Vascular bundle of *P.cirrhifolium* (Linn.).

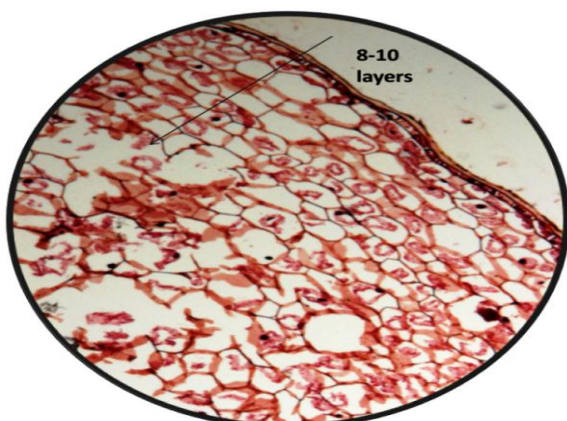


Figure 12: T.S Rhizome of Market Sample under the name of *Meda-Mahameda*.

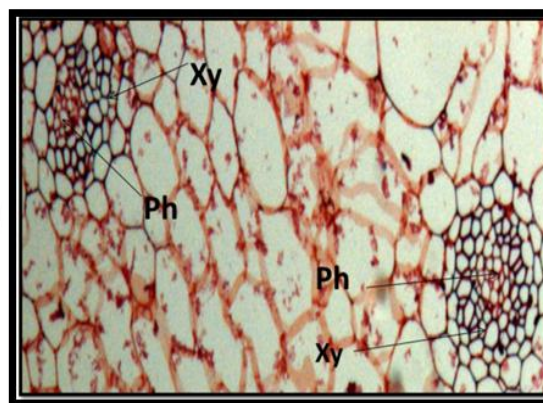


Figure 13: Vascular bundle of market sample.

1. Thin Layer Chromatography of *Jivak*, *Rishbhak* & Market Sample-

Sample	<i>P.verticillatum</i> (Linn.) (<i>Meda</i>)	<i>P.cirrhifolium</i> (Linn.) (<i>Mahameda</i>)	Market sample of <i>Meda-Mahameda</i>
TLC Plate			
R _f Value After Divertization	0.44, 0.56, 0.74, 0.87	0.30, 0.42, 0.66	0.44, 0.56, 0.74

CONCLUSION AND RECOMMENDATIONS
CONCLUSION

Finally it has been concluded that Pharmacognosy of medicinal herbs is very important as to confirm their identity, quality, purity, potency, safety and efficacy and in organoleptic, microscopic and T.L.C examination, procured market sample (S3) is found to be similar as

Meda. This means for commercial purpose may be somewhere tribal people are cultivating *Meda*.. But due to scarcity, *Mahameda* is rarely available for medicinal purpose.

FUTURE RECOMMENDATIONS

- ❖ Cultivation, collection, and preservation techniques for these plants should be developed.
- ❖ For the quality control, Biochemical biomarkers of these herbs should be investigated.
- ❖ The experimental and Clinical study should be conducted on these plants.
- ❖ Accurate knowledge about their medicinal uses, natural habitat, climate, soil adaptability, growing season, flowering time etc. should be generated.
- ❖ Drug standardization is also mandatory as it will provide reference standards for future. It will help in detection of adulteration or substitution and also maintain efficacy of these herbs.

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