

## Comparative pharmacognostic studies of a well-known ayurvedic drug: Saptarangi

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### Abstract

*Salacia reticulata* a well-known ayurvedic drug with high therapeutic values and used by the ayurvedic practitioners in the name of 'Saptarangi' for diabetes and its common substitute is *Salacia oblonga*. In the present study difference between *S. reticulata* and *S. oblonga* are studied with the help of microscopic anatomical studies, TLC finger printing profiles, Physicochemical characters and organoleptic studies as *S. oblonga* is given in the market for *S. reticulata*. The studies clearly indicate the differences between two species.

**Keywords:** *Salacia reticulata*, *Salacia oblonga*, pharmacognosy, TLC, anatomy

### Introduction

*Salacia species* (Family: Hippocrataceae) are widely distributed in India, Sri Lanka, China and other Southeast Asian countries. About 18 species occur in India (Anonymous WOI) and many plants from this genus (e.g. *S. oblonga*, *S. reticulata*, and *S. prinoidea*) have been used for thousands of years in traditional medicines particularly for the treatment of diabetes and obesity; but also for gonorrhoea, rheumatism, pruritus and asthma. Several reports from studies in animals have described hypoglycemic activity of *Salacia* species, including *S. oblonga*, *S. reticulata*, *S. prinoidea* (syn. *S. chinensis*), and *S. macrosperma*. Further hypoglycemic activity of herbal preparations containing *Salacia* species have also been reported in human studies. Some toxicological studies have suggested minimal adverse effects of the herbal medicine in rodents. Recently, *Salacia* species have been extensively consumed in Japan, the United States and other countries as a food supplement for the prevention of obesity and diabetes, as well as being the subject of broad studies for diabetes management (Li *et al.* 2008 May 23). More recently it has been used as a supplementary food in Japan to prevent diabetes and obesity. Extracts from *Salacia* is consumed in Japan as a food supplement that prevents obesity and diabetes, because it suppresses postprandial hyperglycemia (Li *et al.* 2008). Ayurveda advises that a person suffering from diabetes should drink water left overnight in a mug carved out of *Salacia reticulata* wood. *Salacia oblonga* Wall. Belonging to the Hippocrataceae, is a large woody climber distributed in Southern regions of India and Sri Lanka. It is commonly known as "ponkoranti" due to its golden colored root bark. *S. oblonga* has been used for thousands of years in Ayurvedic medicine for the oral treatment of diabetes (Flammang *et al.*, 2007 Oct). In the present study comparative pharmacognostic studies of on *Salacia reticulata* and *Salacia oblonga* were studied.

### Material and Methods

#### Collection

Roots of the both *S. oblonga* and *S. reticulata* plants were collected from the Karje in Udupi (13 19 56.0 & 74 44 45.0)

and are deposited at VVPL wide voucher specimen numbers VVPL-056 and VVPL-063, respectively.

### Morphology of Plants

***Salacia oblonga*:** A large woody climbing shrub or small tree. Leaves opposite, exstipulate, elliptic-oblong or oblanceolate, shortly acuminate, very shallowly crenate-serrate, glabrous and shining, yellowish when dry. Flowers in axillary pedunculate heads, peduncles very short. Calyx lobes entire. Ovary elongate, conical, much exert from the disk. Fruit large, tuberculate. Light pinkish-orange, seeds 1-4, immersed in pulp. (Gamble 2004).

***Salacia reticulata*:** A climbing shrub, branch-lets more or less prominently lenticellate, terreate. Leaves opposite, coriaceous, ovate or obovate-oblong, reticulate, 6.5 - 9 cm x 4 - 5 cm. Flowers fascicled on axillary tubercles, pedicels 0.65 cm long. Calyx lobes not fringed, lobes short entire. Petals broad at base, 0.4 cm long, thick. Ovary enclosed in the disk. Anther cells dehiscing transversely. Fruit large, tuberculate. (Gamble 2004) TLC fingerprinting profile carried as per (Stahl E 1965). For the histological studies, transverse sections (TS) were prepared and stained (Johansen 1940). Physico-chemical values such as the percentage of total ash, acid-insoluble ash, water-soluble ash, and water and alcohol-soluble extractives were calculated as per the Indian Pharmacopoeia (Anonymous 1998). A standard, Limit for total microbial count provided by WHO Guidelines (1998) was followed and also Indian herbal pharmacopoeia (2002).



*Salacia oblonga* (Root),

*Salacia reticulata* (Root)

Fig 1

## Results and Discussion

### Results

Plants were collected from Karje in Udipi and were identified and authenticated by referring Gamble (2004), Saldanha (1984, 1996) and Ravikumar and Ved (2000) [6]. And then deposited to VVPL Raw drug museum as a voucher specimen.

### Physicochemical constants

There were no earlier reports on these parameters; this is the first report of this kind on both species under study. The study revealed the unique ash and extractive values for the species. The organoleptic studies showed almost similar features. Physicochemical constants and organoleptic characters values see Table- 1.

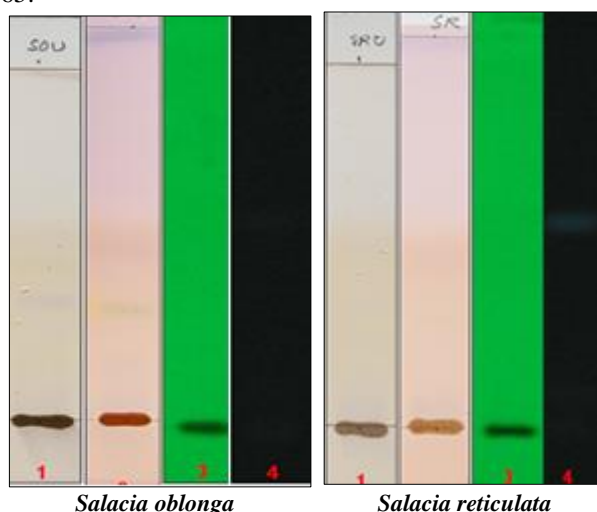
**Table 1:** Physicochemical and Organoleptic Parameters

Physicochemical Constants				
Parameters	<i>S. oblonga</i>		<i>S. reticulata</i>	
	Values	Limits	Values	Limits
TA	5.6%	NA	5.1%	NA
AIA	0.75%	NA	0.8%	NA
ASE	7.2%	NA	6.1%	NA
WSE	4.2%	NA	3.6%	NA
Organoleptic Parameters				
Parameters	<i>S. oblonga</i>		<i>S. reticulata</i>	
	Values	Limits	Values	Limits
Taste	Mild	NA	Mild	NA
Color	Light brown	NA	Light brown	NA
Odour	Mild	NA	Mild	NA
Texture	Fibrous	NA	Fibrous	NA

NA - Not Available (TA - Total Ash; AIA - Acid Insoluble Ash; ASE - Alcohol Soluble Extractive; WSE - Water Soluble Extractive)

### TLC finger printing Profile

TLC finger printing profile of *Salacia oblonga* root extract showed one faint band after spraying with H<sub>2</sub>SO<sub>4</sub> and anisaldehyde at R<sub>f</sub> values of 0.34 and 0.28 respectively. Number of bands were observed when visualized under UV radiation under both short and long wavelengths. But *S. reticulata* showed only one distinct band when visualized under long wavelength UV radiation (366nm) at R<sub>f</sub> value of 0.65.



**Fig 2:** TLC Finger Printing Profile

1. Sprayed with 10% Sulphuric acid, 2. Sprayed with Anisaldehyde reagent, 3. Observed under short UV (254 nm), 4. Observed under long UV (366 nm)

### Anatomical Studies

#### T.S of *Salacia oblonga*

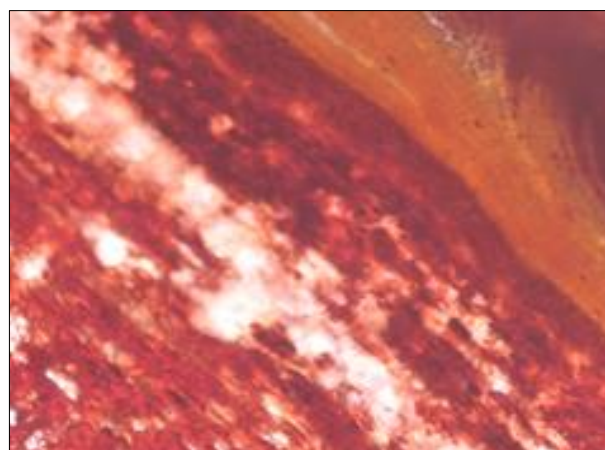
Thick periderm outermost layer with lenticels (Fig 2), cambial cells divides tangentially produce secondary tissues, single layered pericycle becomes meristematic, lying against protoxylem cells and abundant numbers of starch grains are present. In cambium region more number of xylem elements than phloem elements (Fig 5), Secondary xylem is present in inner side and secondary phloem towards outer side (Fig 5), well-developed vascular bundles, with radial vascular bundles with exarch xylem, xylem vessels and xylem tracheids are present. Xylem vessels are many in number (Fig 8), less numbers of medullary rays are present in between xylem cells. (Fig 8).

#### T.S of *Salacia reticulata*

This anatomical character was almost similar to *S. oblonga*, thick periderm outermost layer with lenticels (Fig 4). Cambial cells divides tangentially produce secondary tissues; single layered pericycle becomes meristematic, lying against protoxylem cells and abundant numbers of starch grains are present. (Fig 6), In cambium region more number of xylem elements than phloem elements (Fig 6), Secondary xylem is present in inner side and secondary phloem towards outer side, (Fig 6), Well-developed vascular bundles, xylem vessels and xylem tracheids are present. Xylem vessels are many in number (Fig 6), Maximum numbers of medullary rays are present in between xylem cells. (Fig 8)



**Fig 3:** Thick periderm layer



**Fig 4:** Thick periderm layers

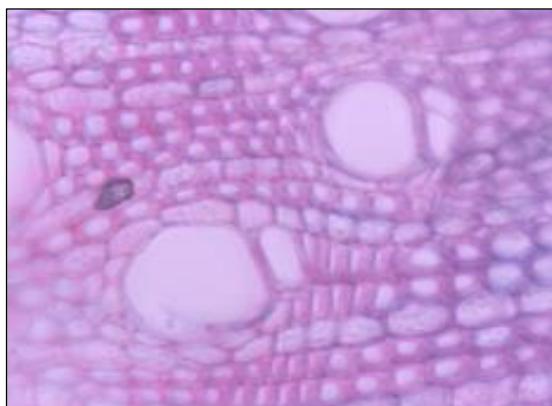


Fig 5: Secondary cortex with xylem cells



Fig 6: Secondary cortex with xylem cells

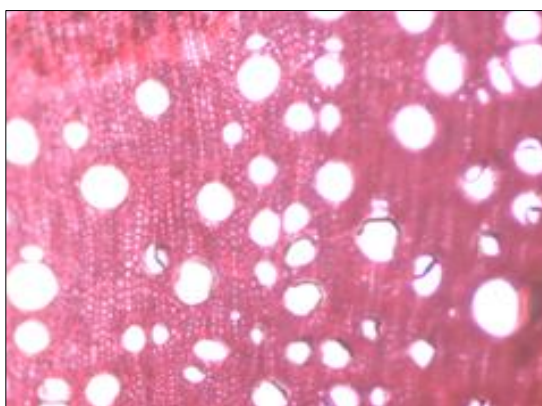


Fig 7: Medullary rays

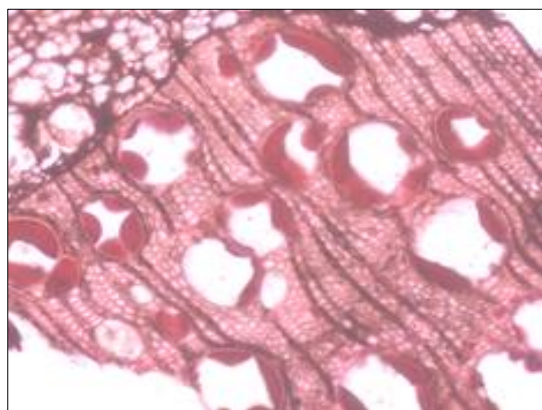


Fig 8: Medullary rays

(PD-Periderm, ED-Endodermis, SX-Secondary xylem, MR-Medullary rays, SP- Secondary Phloem, VB- Vascular bundle)

### Microbial Limit Test

Results obtained for microbial assay of *S. oblonga* showed 7200 ( $7.2 \times 10^3$  Cfu/gm) colonies for aerobic bacteria and 2000 ( $2 \times 10^3$ ) for yeast, for the plant *S. reticulata* 6400 ( $6.4 \times 10^3$  Cfu/gm) colonies for aerobic bacteria and 800 ( $0.8 \times 10^3$  Cfu/gm) colonies for yeast and moulds, which are for below the limits of international guidelines. Limits referred by WHO guidelines 1998, Indian herbal pharmacopoeia 2002. Total aerobic bacterial count (TABC):  $\leq 1 \times 10^7$  & Total yeast and mould count (TYMC):  $\leq 1 \times 10^5$ .

### Discussion

From the above results the physicochemical constants and organoleptic characters values are almost similar for the total ash, acid insoluble ash, but in alcohol soluble extractive more percentage of extractive values in *S. oblonga* as compared to that of *S. reticulata*, and in water-soluble extractive there was no much difference studied. Studies on physicochemical parameters can serve as a valuable source of information and provide suitable standards to determine the quality of this plant material in future investigations. For the TLC finger printing profile in *S. oblonga* shows two bands observed when sprayed with  $H_2SO_4$  and anisaldehyde at Rf values of 0.34 and 0.28 respectively, but in *S. reticulata* only one band at long UV wave length (366nm) at Rf value of 0.65. The TLC finger print profile Rf values were recorded which would serve as a reference standard for the scientist engaged in research on the medicinal properties of this plant. As for anatomical studies concerned all the microscopic characters similar except in *S. reticulata* more number of medullary rays compare to *S. oblonga* this can be one of the future mane of *S. reticulata* for identification. However, the roots of *S. reticulata* are sold in the form of dried cut pieces and are more likely to be substituted with roots of the other plants sold under the same trade name 'Sapatarangi'. In such cases microscopy alone may be inadequate to identify the true plant material. Also microscopy does not reveal much about the deterioration of the crude drug, therefore many of the modern herbal pharmacopoeias and other regulatory agencies like WHO included TLC as a powerful and most economical tool for true identification of the plant material, especially in terms of its chemical constituents. In Microbial limit test aerobic bacteria, yeast and moulds are more in *S. oblonga* as compared to *S. reticulata*, and are confirm with the limits mentioned by Ayurvedic pharmacopoeia of India and WHO guidelines.

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