

Biochemical evaluation of phenol, tannin and ascorbic acids content of *Boswellia serrata* and *Rhus mysorensis* of Laling forest, Dhule district in Maharashtra.

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ABSTRACT:

Plant extract of *Boswellia serrata* and *Rhus mysorensis* has been featured as an important component of Ayurvedic medicine for thousands of years. The seasonal variation of phenol, tannin and ascorbic acid content have been investigated from leaves, wood and bark of *Boswellia serrata* and *Rhus mysorensis* are the medicinally important plant of Laling forest, Dhule district in Maharashtra. Comparative account of phenol content of leaves, wood and bark of *Rhus mysorensis* showed higher level (range 1.584 to 4.562 mg/g dry wt.) than *Boswellia serrata* (range 1.387 to 3.789 mg/g dry/wt.) . Comparative account of tannin content of leaves, wood and bark of *Rhus mysorensis* showed higher level (range 0.177 to 0.465 mg/g dry wt.) ,than *Boswellia serrata* (range 0.132 to 0.370 mg/g dry wt.). Comparative account of ascorbic acids content of leaves, wood and bark of *Rhus mysorensis* showed higher level (range 1.290 to 3.620 mg/g dry wt.), than *Boswellia serrata* (range 1.152 to 3.168 mg/g dry wt.).

Key words: Phenol, tannin, ascorbic acid, *Boswellia serrata* and *Rhus mysorensis*

INTRODUCTION:

Medicinal plants being as an important natural resource and potentially safe drugs can play an important role in human health by contributing herbal medicines. The high cost of allopathic medicine and their potential side effects, encouraged the people to use the traditional medicine. The increasing demand of plant extracts to use in the cosmetic, food and pharmaceutical industries suggests that systematic studies of medicinal plants are very important in order to find active compounds and their use as a medicine for curing various diseases. India has one of the oldest, richest and most diverse cultural traditions associated with the use of medicinal plants as medicine like Ayurveda, Siddha, Unani and the Tibetan systems

(Retnam and Martin, 2006). Indian economy depends greatly on the number of wild plant species. The forest of Maharashtra covers a huge area of 61.939 sq km. thus covering about 21% of the total land. The forest of Dhule district covers an area of 209 thousand hectares which is 28.5% of the total state area. Laling forest area has spread over 4200 hectares. The Laling forest spread around the Laling fort and situated 9.65 kilometers away from Dhule city. The forest area around the Laling fort having rich plant diversity. Many medicinal plants, herbs, shrubs, climbers and evergreen trees spread Laling forest around the Laling fort. Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years (Felter and Lloyd, 1898; Howes, 1950).

Boswellia serrata (Salai/Salai guggul) (Family: Burseraceae; Genus: *Boswellia*) is a moderate to large sized branching tree that grows in dry mountainous regions of India, Northern Africa and the Middle East (Maupetit, 1984; Leung AY, Foster, 1996). Since ancient times, three of these species have been considered as 'true Frankincense' producing trees (Wallis, 1967). *Boswellia* is an effective anti-inflammatory; it can be an effective painkiller and may prevent the loss of cartilage. Some studies have found that it may even be useful in treating certain cancers, such as leukemia and breast cancer.

In addition to its beneficial use for arthritis, this gummy resin is also mentioned in traditional Ayurvedic and Unani texts as an effective remedy for diarrhea, dysentery, ringworm, boils, fevers (antipyretic), skin and blood diseases, cardiovascular diseases, mouth sores, bad throat, bronchitis, asthma, cough, vaginal discharges, hair-loss, jaundice, hemorrhoids, syphilitic diseases, irregular menses and stimulation of liver. It is also diaphoretic, astringent, and diuretic and acts both as internal and external stimulant. Modern medicine and pharmacology strongly point out to its use as an ant arthritic, anti-inflammatory, antihyperlipidemic (controls blood lipids), ant atherosclerotic (ant coronary plaque), analgesic (pain-reliever) and hepatoprotective (protects the liver) (Sharma et.al, 2004; Mathe et.al, 2004).

The plant *Rhus mysorensis* is known to possess various active constituents like steroids, alkaloids, flavonoids, glycosides, tannins and Phenols. The plant is screened for hepatoprotective, anti-diabetic, hypolipidemic, antimicrobial and anti-oxidant activity. The increasing demand of plant extracts to use in the cosmetic, food and pharmaceutical industries suggests that systematic studies of medicinal plants are very important in order to find active compounds and their use as a medicine for curing various diseases (Tewari et.al, 2012). According to World Health Organization, medicinal plants would be the best source to obtain a variety of drugs. Therefore, such plants should be investigated to better understand their properties, safety and efficacy (Doughari et.al, 2008). *Rhus mysorensis* is one among such medicinal traditionally used plants. Fruits are used to treat Dysentery, Leaf decoction is given in itching (Priti and Yadav, 2006), Leaves given in Diarrhea and Stomatitis, Leaf paste rubbed against rash and allergy (Umberto,2012), The root, stem and leaf are traditionally used in treatment of diabetes (Madhava Chetty et.al.,2008), famine periods , plant extracts for protection against HSV2 infection , Immune-modulating properties, Antifertility Psoriasis (Jeevan Ram et.al., 2007), Psoriasis (Venkata Subbaiah and Savithramma, 2012).

MATERIALS AND METHOD:

Total Phenols: The convergence of aggregate phenols in the plant extricate was controlled by utilizing Folin strategy (Malick and Singh, 1980). Catechol was utilized as standard. 0.2 ml ethanolic (80%) extract (4 mg/ml) of plants and 0.2 ml Folin reagent were mixed thoroughly. After 4 min, 1 ml of 15% sodium carbonate was added and the mixture was allowed to stand for 2 hours at room temperature. The absorbance was measured at 760 nm. The convergence of aggregate phenols was estimated identical to catechol (as a standard medication) by utilizing standard adjustment bend of catechol.

Total Tannin: Total tannin in plant extract was determined by Folin-Denis method (Schanderi, 1970). 0.5 g of powdered medication was bubbled for 30 min with 75 ml of twofold refined water. It was cooled, centrifuged at 2000 rpm for 20 min and supernatant was gathered in 100 ml volumetric flagon and the volume was made up with twofold refined water. 1 ml of this arrangement was exchanged to a 100 ml volumetric cup containing 75 ml water and 5 ml of Folin-Denis reagent+10 ml of sodium carbonate arrangement were added and weakened up to 100 ml with water. In the wake of shaking, the absorbance was perused at 700 nm after 30 min. Clear arrangement was set up with water rather than the example. Standard graph was prepared by using 0-100 µg of tannic acid. Add up to tannin substance of the example was estimated identical to tannic corrosive by standard chart.

Ascorbic Acid: Add up to ascorbic corrosive substance in plant remove was controlled by (Sadasivam and Balasubraminan, 1987) method. 2 g dried powdered example was separated with 4% oxalic corrosive and the volume was made up to 100 ml. It was centrifuged at 1000 rpm for 10 min. 5 ml supernatant fluid was exchanged to a cone shaped carafe and 10 ml of 4% oxalic corrosive was included. It was titrated against standard colour arrangement (2, 6-dichlorophenolindophenol) to a pink end-point. The technique was rehashed with a clear arrangement (without including test). 5 ml ascorbic corrosive of 100 ppm was utilized as standard. Ascorbic acid content was calculated using the formula.

RESULTS AND DISCUSSION:

1) *Boswellia serrata* -The continuous two year investigation showed that leaves generally accumulated phenol (ranges from 4.300 to 4.562 mg/g dry wt.), higher level of phenol observed at summer 4.562 mg/g dry wt. as compared to winter 4.421 and monsoon 4.300 mg/g dry wt.. In wood it was observed that at summer 3.390 mg/g dry wt. of phenol accumulates higher than winter i.e. 3.228 mg/g dry wt. and monsoon 3.136 mg/g dry wt., summer show highest level of phenol. While in bark phenol ranges from 1.584 mg/g dry wt. to 1.828 mg/g dry wt. higher level observed in summer 1.828 mg/g dry wt. as compared to winter 1.696 mg/g dry wt. and monsoon 1.584 mg/g dry wt.. The percentage of phenol were found to be increasing order of leaves < wood < bark.

The tannin of leaves show higher level than bark and wood. In leaves tannin ranges (0.380

mg/g dry wt. to 0.465 mg/g dry wt.), higher level observed at summer 0.465 mg/g dry wt. as compared to winter 0.421 mg/g dry wt. and monsoon 0.380 mg/g dry wt.. In wood tannin accumulated high level observed at summer season (i.e. 0.353 mg/g dry wt. than winter i.e. 0.326 mg/g dry wt. and monsoon 0.301 mg/g dry wt., While in bark range of tannin is from 0.177 to 0.194 mg/g dry wt., highest level observed at summer 0.194 mg/g dry wt. as compared to monsoon 0.177 mg/g dry wt. and winter 0.144 mg/g dry wt. respectively. The percentage of tannin were found to be in increasing order of leaves < wood < bark.

The ascorbic acid ranges of leaves show from 3.011 mg/g dry wt. to 3.620 mg/g dry wt. highest level observed at summer season i.e. 3.620 mg/g dry wt. as compared to winter i.e. 3.345 mg/g dry wt. and monsoon 3.011 mg/g dry wt.. In wood ascorbic acid accumulation observed high at summer 2.612 mg/g dry wt. as compared to winter i.e. 2.294 mg/g dry wt. and monsoon i.e. 1.988 mg/g dry wt. The ascorbic acid accumulation in bark show lower than wood and leaves. Bark show higher accumulation of ascorbic acid at summer 1.409 mg/g dry wt. than winter 1.379 mg/g dry wt. and monsoon 1.290 mg/g dry wt.. The concentration of ascorbic acid were found to be increasing order of leaves < wood < bark (Table No. 1; Graph No. 1).

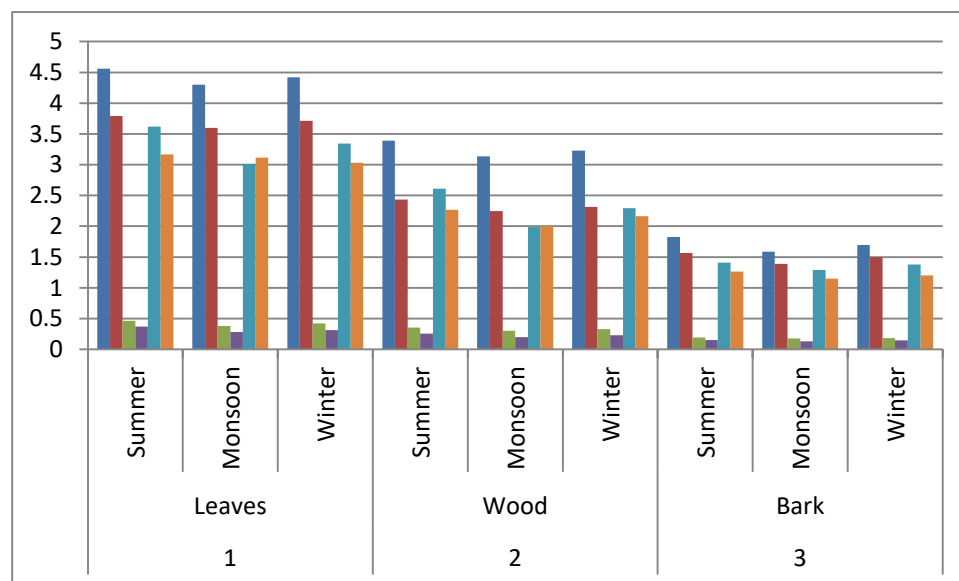
2) *Rhus mysorensis*- The phenol content of leaves show ranges from 3.600 to 3.789 mg/g dry wt. much more observed in summer 3.789 mg/g dry wt. than in winter 3.711 mg/g dry wt. and in monsoon 3.600 mg/g dry wt. In wood highest level observed at summer 2.432 mg/g dry wt. as compared to winter 2.312 mg/g dry wt. and monsoon 2.244 mg/g dry wt., while in bark phenol accumulated much more in summer 1.567 mg/g dry wt. than winter 1.499 mg/g dry wt. and monsoon 1.387 mg/g dry wt. The percentage of phenol were found to be increasing order of leaves < wood < bark.

The tannin content of wood showed lower than leaves. In wood, tannin ranges from 0.283 mg/g dry wt. to 0.370 mg/g dry wt., higher accumulation of tannin observed at summer 0.370 mg/g dry wt. than winter 0.310 mg/g dry wt. and monsoon 0.283 mg/g dry wt. The range of tannin content of wood was between 0.200 mg/g dry wt. to 0.256 mg/g dry wt., it show lower than leaves. Higher level observed at summer i.e. 0.256 mg/g dry wt. as compared to winter 0.229 mg/g dry wt. and monsoon 0.200 mg/g dry wt., while in bark, higher accumulation of tannin observed at summer 0.150 mg/g dry wt. than in winter 0.144 mg/g dry wt. and monsoon 0.132 mg/g dry wt.

The ascorbic acid content of leaves, bark and wood were usually higher in summer. The range of ascorbic acid content of leaves was higher in summer i.e. 3.168 mg/g dry wt. than winter 3.115 mg/g dry wt. and monsoon 3.031 mg/g dry wt. The range of ascorbic acid content of wood was between 2.003 mg/g dry wt. to 2.267 mg/g dry wt. higher accumulation observed at summer 2.267 mg/g dry wt. as compared to winter (2.161 mg/g dry wt.) and monsoon (2.003 mg/g dry wt.). The range of ascorbic acid content of bark was higher in summer i.e. 1.265 mg/g dry wt. than winter 1.203 mg/g dry wt. and monsoon 1.152 mg/g dry wt. The concentration of ascorbic acid were found to be in increasing order of leaves < wood < bark (Table No. 1; Graph No. 1).

Table 1: Seasonal variation of phenol, tannin and ascorbic acid levels of different plant parts of *Boswellia serrata* and *Rhus mysorensis*

Sr. No.	Plant part	Season	Phenol (mg/g dry wt.)		Tannin (mg/g dry wt.)		Ascorbic acid (mg/g dry wt.)	
			Plant 1	Plant 2	Plant 1	Plant 2	Plant 1	Plant 2
1	Leaves	Summer	4.562	3.789	0.465	0.370	3.620	3.168
		Monsoon	4.300	3.600	0.380	0.283	3.011	3.115
		Winter	4.421	3.711	0.421	0.310	3.345	3.031
2	Wood	Summer	3.390	2.432	0.353	0.256	2.612	2.267
		Monsoon	3.136	2.244	0.301	0.200	1.988	2.003
		Winter	3.228	2.312	0.326	0.229	2.294	2.161
3	Bark	Summer	1.828	1.567	0.194	0.150	1.409	1.265
		Monsoon	1.584	1.387	0.177	0.132	1.290	1.152
		Winter	1.696	1.499	0.181	0.144	1.379	1.203

Plant 1 - *Boswellia serrata*Plant 2 - *Rhus mysorensis***Graph No. 1 - Seasonal variation of phenol, tannin and ascorbic acid levels of different plant parts of *Boswellia serrata* and *Rhus mysorensis***

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