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Research Article

Biochemical profile of *Boswellia serrata* and *Rhus mysorensis*

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Abstract

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The seasonal variation of proteins and amino acids content have been investigated from leaves, wood and bark of *Boswellia serrata* and *Rhus mysorensis* are the medicinal important plant of Laling forest Dhule district of Maharashtra. Comparative account of protein content of leaves, wood and bark of *Rhus mysorensis* showed higher level (range 1.897 to 2.754 mg/g dry wt.) than *Boswellia serrata* (range 1.846 to 2.312 mg/g dry/wt.). Comparative account of amino acid content of leaves, wood and bark of *Rhus mysorensis* showed higher level (range 0.911 to 1.074 mg/g dry wt.) than *Boswellia serrata* (range 0.745 to 0.896 mg/g dry wt.).

Keywords: Protein, amino acid, *Boswellia serrata* and *Rhus mysorensis*

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INTRODUCTION

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 systems¹. 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 Hectors which is 28.5% of the total state area. In the present study of plant diversity of Laling forest situated in Dhule district. 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. Since time immemorial, plants and their products have been the primary resource of food, shelter, clothing, flavors, and fragrances as also valuable ingredients for medicines for mankind. In this context, natural resins have played an important role. These have also been used as adhesives, as ingredients for cosmetic preparations, as fragrances in daily rituals and in religious ceremonies, as coating materials and also for their different curative powers^{2,3}.

In ancient times, Hindus, Babylonians, Persians, Romans, Chinese and Greeks as well as the people of old American civilizations used natural resins primarily for embalming and for its incense in cultural functions. They firmly believed

that when these materials get in contact with fire, the smoke and the fragrance they produce not only soothe their souls but also please their gods. Burning of these natural resins had become an important component of their cultural life. They burned these resins during sacrificial ceremonies and in their daily rituals to prevent the influence of evil spirits on their souls or to honour the dead or living ones^{4,5}. *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^{6,7}. Since ancient times, three of these species have been considered as 'true Frankincense' producing trees⁸.

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 diarrhoea, 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 antiarthritic, antiinflammatory, antihyperlipidemic (controls blood lipids), antiatherosclerotic (anticoronary plaque), analgesic (pain-reliever) and hepatoprotective (protects the liver)^{9,10}.

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 diseases¹¹. 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 efficacy¹². *Rhus mysorensis* is one among such medicinal traditionally used plants. Fruits are used to treat Dysentery; Leaf decoction is given in itching¹³. Leaves given in Diarrhea and Stomatitis, Leaf paste rubbed against rash and allergy¹⁴. The root, stem and leaf are traditionally used in treatment of diabetes¹⁵, famine periods, plant extracts for protection against HSV2 infection, Immune-modulating properties, Antifertility Psoriasis¹⁶, Psoriasis¹⁷.

The phytochemical constituents and medicinal properties of most of the medicinal plants were recorded in the last few decades by a number of workers^{18,19}. These medicinal plants are subjected to various processes and are then administered to the patients. The survey and documentation of medicinally important plants in each and every place is very much important for easy identification of local traditional healers, conservation and sustainable utilization. Plants have always played a major role in the treatment of human traumas and diseases worldwide. They have been used as sources of modern drugs, either by providing pure compounds, starting materials for partial synthesis of useful compounds or models for synthesis of new drugs. According to the World Health Organization (WHO) as much as 80% of world's population depends on traditional medicine for their primary health care needs²⁰.

MATERIALS AND METHOD

1) Quantitative estimation of Protein: The protein was quantitatively estimated by the Lowry et.al., 1951 method .

Chemicals: 1) 0.1% N NaOH – (4gm in 1000ml)
 2) 2% Na₂CO₃ (2 gm in 100 ml distilled water)
 3) 0.5% CuSO₄ (0.5 gm in 100 ml distilled water)
 4) 1% Na- K tartarate
 5) 5% Trichloro acetic acid /per Chloric acid

Reagents: 1) Lowry A-2% Na₂CO₃ in 0.1% N NaOH
 2) Lowry B-5% CuSO₄ in 1% Na- K tartarate
 3) Lowry C-98 ml A and 2ml B,
 4) Lowry D- Folin phenol reagent.

Procedure: 1 gm of plant material was homogenized with 10 ml 80% ethanol. The extract was centrifuged at 5000 rpm. For 5 minute and the supernatant was discarded 5% 10 ml Trichloro acetic acid (TCA) or per chloric acid (PCA) was add to residue and incubated at 80°C for 20 minutes. The pellet was centrifuged and the supernatant was discarded. Residue was washed with 10 ml distilled water and again recentrifuged. The supernatant was discarded 2% 10 ml Na₂CO₃ in 0.1 N NaOH was added to the residue and incubated for an hour at 30°C and again centrifuged and residue was discarded. The final volume of supernatant was measured and it was used as a sample for protein. 1 ml of aliquot of sample was taken and 5 ml reagent C was added to it mixed it thoroughly. The sample was incubated for 10 minutes and 1 ml of reagent D was added to it. The colour intensity was read at 660 nm using Spectrophotometer. The protein concentration of an unknown sample was calculated using standard graph.

2) Quantitative estimation of total Amino Acid:

Estimation of total amino acid was carried out by Krishnamurthy et. al., 1989 method.

Reagents: 1) Alcoholic ninhydrin. (100 ml alcohol + 400 mg ninhydrin)

2) Glycine (std.) (10 mg glycine + 100 ml distilled water)

Procedure: 500 mg plant material was ground in mortar and pestle with few drops of cold 80% ethanol. Then 2.5 ml of distilled water and 10 ml of boiling 80% ethanol were add to it. The extract was centrifuged for 15 minutes at 1,000 rpm. Residue was discarded the supernatant was collected and total volume was made 15ml with distilled water. Test tube was kept 60°C for 20 minutes. The test tube was cooled and 1 ml 50% ethanol was added. Read at 420 nm in spectrophotometer. Glycine was used as stand rand.

RESULTS AND DISCUSSION

1) *Boswellia serrata* - The continuous two year investigation showed that the seasonal variation in protein content of leaves are (range from 2.467 to 2.754 mg/g dry wt.), higher level of proteins observed at summer 2.754 mg/g dry wt. as compared to winter 2.557 and monsoon 2.467 mg/g dry wt.. In wood it was observed that at summer 2.292 mg/g dry wt. of protein accumulates and are higher than winter i.e. 2.265 mg/g dry wt. and monsoon 2.186 mg/g dry wt. The protein found in the bark (range from 1.897 mg/g dry wt. to 2.087 mg/g dry wt.), higher level observed in summer 2.087mg/g dry wt. as compared to winter 1.990 mg/g dry wt. and monsoon 1.897 mg/g dry wt.. The percentage of protein were found to be increasing order of leaves < wood< bark.

The amino acids ranges of leaves show from 0.993 mg/g dry wt. to 1.074 mg/g dry wt. highest level observed at summer season i.e. 1.074 mg/g dry wt. as compared to winter i.e. 1.032 mg/g dry wt. and monsoon 0.993 mg/g dry wt.. In wood amino acids accumulation observed high at summer 1.013mg/g dry wt. as compared to winter i.e. 0.954 mg/g dry wt. and monsoon i.e. 0.917 mg/g dry wt. The amino acids accumulation in leaves show higher than wood and bark. Bark show higher accumulation of amino acids at summer 0.943 mg/g dry wt. than winter 0.923 mg/g dry wt. and monsoon 0.911 mg/g dry wt. The concentration of amino acids were found to be increasing order of leaves < wood<bark (Table No. 1; Graph No. 1).

2) *Rhus mysorensis*- The protein content of leaves show ranges from 2.166 to 2.312 mg/g dry wt. much more observed in summer 2.312 mg/g dry wt. than in winter 2.235 mg/g dry wt. and in monsoon 2.166 mg/g dry wt. In wood highest level protein observed at summer 2.187 mg/g dry wt. as compared to winter 2.123 mg/g dry wt. and monsoon 2.067 mg/g dry wt., while in bark proten accumulated much more in summer 2.011 mg/g dry wt. than winter 1.964 mg/g dry wt. and monsoon 1.846 mg/g dry wt. The percentage of protein were found to be increasing order of leaves< wood < bark.

The amino acid content of leaves showed higher than wood and bark. In leaves, amino acid ranges from 0.823 mg/g dry wt. to 0.896 mg/g dry wt., higher accumulation of amino acid observed at summer 0.896 mg/g dry wt. than winter 0.865 mg/g dry wt. and monsoon 0.823 mg/g dry wt. The range of amino acid content of wood was between 0.811 mg/g dry wt. to 0.854 mg/g dry wt., it show lower than leaves. Higher level observed at summer i.e. 0.854 mg/g dry wt. as compared to winter 0.823 mg/g dry wt. and monsoon 0.811 mg/g dry wt., while in bark, higher accumulation of amino acid observed at summer 0.801 mg/g dry wt. than in winter 0.787 mg/g dry wt. and monsoon 0.745 mg/g dry wt.

Table 1: Seasonal variation of proteins and amino acids levels of different plants parts of *Boswellia serrata* and *Rhus mysorensis*

PLANT PARTS	SEASON	PROTEINS (Mg/g dry. wt.)		AMINO ACIDS (Mg/g dry.wt.)	
		Plant 1	Plant 2	Plant 1	Plant 2
Leaves	Summer	2.754	2.312	1.074	0.896
	Monsoon	2.467	2.166	0.993	0.823
	Winter	2.557	2.235	1.032	0.865
Wood	Summer	2.292	2.187	1.013	0.854
	Monsoon	2.186	2.067	0.917	0.811
	Winter	2.265	2.123	0.954	0.823
Bark	Summer	2.087	2.011	0.943	0.801
	Monsoon	1.897	1.846	0.911	0.745
	Winter	1.990	1.964	0.923	0.787

Plant 1 - *Boswellia serrata* Plant 2 - *Rhus mysorensis*

Graph 1: Seasonal variation of proteins and amino acids levels of different plants parts of *Boswellia serrata* and *Rhus mysorensis*

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