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BIOCHEMICAL EVALUATION OF SOME MEDICINAL PLANTS OF MARATHWADA REGION IN MAHARASHTRA

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Abstract

The seasonal variation of starch , total sugar and total carbohydrates content have been investigated from leaves, wood and bark of *Butea monosperma, Madhuca indica and Mimusops elengi* are the medicinally important plant of Marathwada region. Comparative account of starch content of leaves, wood and bark of *Madhuca indica* showed higher level (range 6.208 to 9.883 mg/g dry wt.) than *Butea monosperma* (range 2.415 to 6.151 mg/g dry/wt.) and *Mimusops elengi* (range 5.990 to 7.869 mg/g dry wt.). Comparative account of total sugar content of leaves, wood and bark of *Madhuca indica* showed higher level (range 2.472 to 4.458 mg/g dry wt.) than *Butea monosperma* (range 1.257 to 5.021 mg/g dry wt.) and *Mimusops elengi* (range 1.144 to 2.167 mg/g dry wt.). Comparative account of total carbohydrate content of leaves, wood and bark of *Madhuca indica* showed higher level (range 8.718 to 14.045 mg/g dry wt.) than *Butea monosperma* (range 3.958 to 10.748 mg/g dry wt.) and *Mimusops elengi* (range 7.516 to 9.937 mg/g dry wt.).

INTRODUCTION

Carbohydrates is an organic compound with the empirical formula $C_m(H_2O)_n$ that is consists only of carbon, hydrogen, and oxygen, with a hydrogen: oxygen atom ratio of 2:1 The carbohydrates (saccharides) are divided into four chemical groupings: monosaccharides, disaccharides, oligosaccharides, and polysaccharides. In general, the monosaccharides and disaccharides, which are smaller (lower molecular weight) carbohydrates, are commonly referred to as sugars. Carbohydrates perform numerous roles in living things. Polysaccharides serve for the storage of energy and as structural components the 5-carbon monosaccharide ribose is an important component of coenzymes and the backbone of the genetic molecule known as RNA. The related deoxyribose is a component of DNA. Saccharides and their derivatives include many other important biomolecules that play key roles in the immune system, fertilization, preventing pathogenesis, blood clotting, and development. In food science and in many informal contexts, the term carbohydrate often means any food that is particularly rich in the complex carbohydrate starch or simple carbohydrates, such as sugar.

The phytochemical constituents and medicinal properties of most of the medicinal plants were recorded in the last few decades by a number of workers (Joshi, 2000, Nudrat and Usha, 2005). These medicinal plants are subjected to various processes and are then administrated 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. In India, we could locate thousands of plants, especially the angiosperms that are being exploited by the natives tribal in a variety of ways. The most important utilization of these plants is their application in medicines. However, plants and their parts and the pattern of administration vary from person to person. Thus, there is enormous scope for tribal

medicines based on plant products which are yet to be studied, analyzed and documented. 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 needs (Azaizeh et al., 2003).

Butea monosperma (Lam.) is an indispensable tree. Tribals use its flowers and young fruits. The plant is used in Ayurvedic, Unani and Siddha medicine for various ailments. Almost all the parts of the plant namely root, leaves, fruit, stem bark, flowers, gum young branches are used as medicine, food, fibre and for other miscellaneous purposes such as fish poison, dye, fodder, utensils, etc. (Burli and Khade, 2007) . The bark is reported to possess antitumor and antiulcer activities.The root bark is used as an aphrodisiac, analgesic and antihelmintic whereas the leaves possess antimicrobial properties. (Kasture, et.al., 2000)

Madhuca indica is medicinally and commercially useful. The plant parts like stem bark, corolla lobes, seeds and seed oil are used in diabetes, burns, scalds, bronchitis, rheumatism, cough, piles, galactagogue skin diseases, tonsillitis, stomach-ache, aphrodisiac and respiratory diseases and have laxative, insecticidal and pesticidal properties (Kirtikar and Basu 1980). The methanolic extracts of flowers, leaves, stem and stem bark of M. longifolia have been reported to possess antibacterial activity against Bacillus anthracis, B. pumilus, B. subtilis, Salmonella paratyph and Vihrio cholerae (Trivedi, et.al., 1980).

Mimusops elengi belongs to the family Sapotaceae. It is an evergreen tree, 5-8 m tall and is cultivated throughout our country as an ornamental tree. The bark is used as a gargle for odontopathy, ulitis and ulemorrhagia. Fruits are used as astringent, coolant and anthelmintic. The tender stems are used as tooth brushes, and in cystorrhea, diarrhea and dysentery. The seeds are used in constipation (Nair and Chanda, 2007). Different solvent extracts of

bark, fruits (fleshy portion) and leaves of Mimusops elengi were screened for their antibacterial and antifungal activities against some pathogenic bacteria and fungi. (Abbas Ali 2008) Mimusops elengi is used in the indigenous system of medicine for the treatment of various ailments. Several therapeutic uses as cardiotonic, alexipharmic, stomachic, anthelmintic and astringent. (Kirtikar and Basu, 1935). The fruits are used in chronic dysentery, constipations; flowers are used as snuff to relive headache, lotion for wounds and ulcers. Barks are used to increase fertility in women and known to have antiulcer activity (Shah, et. al., 2003).

MATERIALS & METHODS

Carbohydrates were estimated by methods suggested by McGready (1950), and Nelson (1941):-

Reagents:

1) Somogys reagent (4gm CuSo4+24 gm Anhydrous Na2CO3+16gm Na-K tartarate (Rocheette salt) + 180gm Anhydrous Na2So4.

2) Nelson arsenomolybdate reagent :- (24gm (NH4)6MO7O24, 4H2O (Ammonium molybdate) + (3gm Na2So4, 7H2O).

Both solution were mixed and incubated at 370C for 24 hours before use and stored in brown bottle.

3) Standard sugar solution was prepared by dissolving 10 mg of glucose in 100 ml distilled water.

Procedure:

1 gm of sample were crushed with 10 ml 80% ethanol in mortar by adding acid free sand then filtered through Whatman filter paper. The filtrate and residue were collected separately. The alcoholic residue was taken in 250ml in conical flask. 150ml distilled water & 5ml conc. HCL were added to it. Hydrolyzed for 30 minutes and cooled to room temperature. Na2co3 was added bit-by-bit until the extract became neutral (pH=7). The extract was filtrated. Residue was discarded. Total volume of filtered was served as a sample for starch. First filtrate was taken in conical flask and condensed on water bath unto 2-3 minutes and cooled to room temperature. Lead acetate and K-oxalate 2 gm each (1:1) .were in 15 ml of distilled water added to the filtrate and

then filtered after mixing. Residue was discarded and the volume of filtrate was served for reducing sugar.

20 ml of this filtrate was taken in 150 ml conical flask, 2 ml of conical flask; 2 ml conc.HCL was added to it and corked. It was then hydrolyzed for 30 minutes and cooled at room temperature. Na2co3 was added bit-by- bit until the extract became neutral (pH=7). Then this extract was filtered and residue was discarded. The final volume of the filtrate was measured. It was served as a sample for total sugar. 0.5 ml of aliquot sample was taken in each test tube and 1 ml of Somogy's reagent was added to it .All tubes were placed in boiling water bath for 30 minutes, cooled the tubes to room temperature and 1 ml of arsenomolybdate reagent which is poisonous) was added to it . The content was mixed thoroughly. Then the contents were diluted to a total volume of 10 ml and its absorbance measure OD at 560 nm in spectrophotometer.

RESULTS AND DISCUSSION

Carbohydrates are made of carbon, hydrogen and oxygen in accordance with the empirical formula (CH2O) n are of special importance because they direct product of photosynthesis therefore the primary substance from which most other the primary energy storage compound and the basic organic compound found in plant synthesized...

Butea monosperma ¬Lam- (Palas) - Leaves and bark harvested during the summer, monsoon and winter showed almost identical range of Starch, total sugar and total carbohydrates, throughout the year (Table 1) .The leaves were the richest source of starch content 4.79 % to 6.15 % as compared to bark 2.41 % to 4.32 % and wood 3.43 % to 5.43 %. The range of total carbohydrates content in leaves was from 7.58% to 10.74% leaves harvest during the summer showed maximum level of total carbohydrates i.e. (10.74 %).The total carbohydrates concentration of bark was higher in summer (6.35 %) over that of winter (5.43 %) and monsoon (3.95 %) .The total carbohydrates concentration of wood was comparatively low (From 5.166 % to 6.692 %) monsoon 6.662 % maximum concentration of total carbohydrates as compared to summer 5.166 % and monsoon 5.806 %. The concentration of total carbohydrates were found to be

increasing order wood< bark< leaves. (Table 1)

Madhuca indica Gmel – (Mahua)- Total sugar and starch content of is higher in wood as compared to leaves and barks. The continuous two year investigation showed that leaves generally accumulated total carbohydrate ranges from 11.18 % to 11.553 % higher level of total carbohydrates observed at summer 11.553 % as compared to winter 11.506 % and monsoon 11.186 % .In wood it observed that at summer 14.04 % of total carbohydrates accumulates higher than winter i.e. 12.97 % and monsoon 11.89 %. Summer show highest level of level of total carbohydrates .While in bark total carbohydrates ranges from 8.71 % to 9.46 % higher level observed in summer 9.46 % as compared to winter 8.82 % and monsoon 8.71 %. The percentage of total carbohydrates were found to be increasing order of bark< leaves< wood.

The total sugar of wood show higher level than leaves and bark, wood ranges total sugar 4.16 % to 4.45 % higher level observed at monsoon 4.45 % as compared to winter 4.42 % and 4.16 %. In leaves total sugar accumulated high level observed at summer season i.e. (3.84%) than winter i.e. (3.83 %) and monsoon(3.54 %,)While in bark range of total sugar is low, it ranges from 2.47 % to 2.79 % highest level observed at summer 2.79 % as compared to monsoon 2.50 % and winter 2.47 % respectively. The percentage of total sugar were found to be in increasing order of Bark< leaves< wood. The starch ranges of leaves show from 7.63 % to 7.71 % highest level observed at summer season i.e. 7.71 % as compared to winter i.e. 7.674 % and monsoon 7.63 %. In wood starch accumulation observed high at summer 9.88 % as compared to winter i.e.8.55 % and monsoon i.e. 7.43 %. The starch accumulation in bark show low than leaves and wood in bark higher accumulation of starch at summer 6.67 % than winter 6.35 % and monsoon 6.20 %. The concentration of starch were found to be increasing order of bark< leaves < wood. (Table 1).

Mimusops elengi Linn (Bakul) - The range of starch content of leaves was between 5.99 % to 6.41 %, higher accumulation of starch observed at monsoon 6.41 %, as compared to summer 6.26 % and winter 5.99 %. While in wood higher accumulation of starch observed as summer i.e. 7.77 %

than monsoon 7.55 % and winter 7.35 %. In bark starch ranges in between7.39 % to 7.86 % higher accumulation of starch observed at monsoon 7.86% as compared to summer 7.46 % and winter 7.39 %. The concentration if starch were found to be in increasing order of leaves < Bark< wood. The range of total sugar content of leaves was from 1.51 % to 1.73 %, during different season. The range of total sugar observe at summer i.e. 2.16 % as compared to winter i.e. 2.14 % and monsoon 2.03 %, while in bark total sugar accumulated range from 1.14 % to 1.61 % , Higher level of total sugar observed at winter 1.61 % than monsoon 1.14 % and summer 1.44 %. The concentration of total sugar were found to be in increasing order bark < leaves < wood.

The total carbohydrates of total content of leaves was higher in monsoon i.e. 8.14 % than summer 7.99 % and winter 7.51 %The range of total carbohydrates content of wood was between 9.49 % to 9.93 %, higher concentration was observed at summer 9.93 % as compared to monsoon 9.59 % and winter 9.49 % .The range of total carbohydrates content of bark was from 8.90 % to 9.01 % during different season higher level observed at monsoon 9.01% as compared winter 9.00 % and summer 8.90 %. The total carbohydrates concentration were found to be in increasing order of leaves < bark< wood (Table 1).

Table 1

Seasonal variation of total carbohydrates levels of different plants parts of *Butea monosperma*, *Madhuca indica* and *Mimusops elengi*

Plant parts	Season	Starch (mg/g dry wt.)			Total Sugar (mg/g dry wt.)			Total Carbohydrates (mg/g dry wt.)		
		Plant 1	**Plant 2**	**Plant 3**	**Plant 1**	**Plant 2**	**Plant 3**	**Plant 1**	**Plant 2**	**Plant 3**
Leaves	**Summer**	5.727	7.711	6.264	5.021	3.842	1.732	10.74	11.55	7.996
	Monsoon	6.151	7.638	6.414	3.198	3.547	1.732	9.349	11.18	8.147
	Winter	4.799	7.674	5.99	2.787	3.832	1.516	7.587	11.50	7.516
		.								
Wood	**Summer**	3.432	9.883	7.77	1.734	4.166	2.167	5.166	14.04	9.937
	Monsoon	5.435	7.438	7.559	1.257	4.458	2.038	6.692	11.89	9.598
	Winter	4.034	8.556	7.35	1.772	4.422	2.143	5.806	12.97	9.493
Bark	**Summer**	4.324	6.671	7.465	2.03	2.793	1.442	6.354	9.464	8.907
	Monsoon	2.415	6.208	7.869	1.543	2.509	1.144	3.958	8.718	9.013
	Winter	3.16	6.353	7.394	2.277	2.472	1.612	5.437	8.826	9.006

Plant 1. ***Butea monosperma***

Plant 2. ***Madhuca indica***

Plant 3. ***Mimusops elengi***

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