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Biochemical Evaluation of Some Medicinal Plants of Genus *Terminalia* (*Combretaceae*) of Marathwada Region in Maharashtra

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A B S T R A C T

The seasonal variation of total ash, acid soluble ash and acid insoluble ash have investigated in leaves , wood and bark of *Terminalia cuneata* Roth., *Terminalia bellerica* Roxb, *Terminalia chebula* Retz. and *Terminalia catappa* Linn , which are medicinally important. Comparative account of total ash, acid soluble ash and acid insoluble ash content of wood of *Terminalia chebula* showed high level of total ash (range 12.2 % to 12.45 %) and low level of total ash of leaves of *Terminalia cuneata* (range 6.25 % to 6.8 %) . The acid soluble ash showed higher level of bark of *Terminalia catappa* (range 9.25 % to 9.7 %) and lower in leaves of *Terminalia cuneata* (range 4.75 % to 5.1 %). Comparative account of acid insoluble ash of wood of *Terminalia chebula* showed higher (range 2.75 % to 2.9%) and lower in the leaves and bark of *Terminalia cuneata* (range 1.5 % to1.7 %).

Keywords: Total ash, acid soluble ash, acid insoluble ash, medicinal plant, *Terminalia*

A R T I C L E I N F O

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1. Introduction

The phytochemical constituents and medicinal properties of most of the medicinal plants were recorded in treatments for numerous human diseases for thousands of years. Medicinal properties of plants are due to the active

chemical constituents present in different parts of the plant (Mitscher et al, 1980). Plants have always played a major role in the treatment of human traumas and diseases worldwide (Principe *et. al.,* 1991) .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 drugs (Hansel, 1972). 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).

All human beings require a number of complex organic/inorganic compounds in diet to meet the need for their activities. The important constituents of diet are carbohydrates, fats, proteins, vitamins, minerals and water (Indrayan et al., 2005). Plants are the rich source of all the elements essential for human beings. Today, there is a renewed interest in traditional medicine and increasing demands for more drugs from plant sources. This revival of interest in plant-derived drugs is mainly due to the current widespread belief that "greenmedicine" is safe and more dependable than the costly synthetic drugs, many of which have adverse side effects. Ash usually represents the inorganic part of the plant (Tambe et.al., 2012). The seasonal variation of total ash , acid soluble ash and acid insoluble ash have been investigated in leaves, wood and bark of *Terminalia cuneata , Terminalia bellirica, Terminalia chebula and Terminalia catappa.*

Terminalia cuneata Roth. popularly known as Arjuna, Arjan, White mudra , Sadada, Orjun etc. have great medicinal properties, the bark of the trees contain calcium salts, magnesium salts and glucosides, etc., its mature and immature fruits and bark is useful in diseases like wounds, ulcers, inflammation . *Terminalia bellirica* is the best single herb for controlling Kapha. It is a powerful rejuvenative herb that nourishes the lungs, throat, voice, eyes and hairs. It expels stones or other kapha- type accumulation in the digestive, urinary, and respiratory tracts (Indrayan et.al.,2005). It is unique in being both laxative and astringent, so it purges the bowels, while simultaneously toning the tissues of the digestive tract. *Terminalia chebula* Retz. Haritak, is an active ingredient of a Hirda formulation Triphala churn, chebulin, ellagic acid, 2, 4-Chebulyl –B-D-glucopyranosc, chebulic acid, gallic acid, ethyl gallate, bunicalagin, terflavin A, tanic acid, chebulic acid etc. are the major chemical constituents of this plant. It is an astringent, anthelminticner vine, expectorant toxic, carminative, laxative, rejunanative. *Terminalia catappa* Linn., an Indian almond or umbrella tree, is an ornamental tree or cultivated tree, having anti carcinogenic properties, antioxidant as well as anticastogenic characteristics. It contains hydrolysable tannins, flavonoids, triterphnoids etc. The seed is very rich in proteins (19-22%) and oil (50-52) (Muhammad and Oloyede o-b, 2004). The bark contains Catappanin A, novel complex tannin, seven ellagic tannins (Lin Tc and Hsu.F.L., 1999). Ash values were determined with a purpose to find out the total amount and inorganic solutes present in the plant material (Kadam et.al. 2014).

2. Materials and Methods

Attempt was also taken to study the behaviour of powder of plant material with certain chemical reagent as describe by Resenthalar (1930). Method recommended in Pharmacopoeia of India (Anonymous, 1966), and British Pharmacopoeia (Anonymous, 1973) were followed for determining ash value.

Preparation of Ash

3gm of drug was incinerated in a Silica crucible over the burner. The charred material was heated in muffle furnace for six hours at 600-650^{0}c.The ash was found white and free from carbon. It was cooled and weighed on the ash less filter paper

Determination of Acid-Insoluble Ash.

The acid was boiled for 5 minutes with 25ml of dilute hydrochloric acid. Insoluble matter collected in crucible or on an ash

less filter paper and washed with hot water, ignited and weight. Percentage of acid insoluble ash was calculated with reference to the air dried drug..

3. Results and Discussion

***Terminalia cuneata* Roth. -**The total ash of leaves of *Terminalia cuneata* Roth. were ranges from 6.25 % to 6.8 %, higher leave of total ash was found in summer season (6.8 %) than winter (6.45 %) and monsoon (6.25 %). Total ash of bark showed highest level in summer season (7.55 %) as compared to winter (7.35 %) and monsoon (7.2 %). Total ash of wood showed highest level in summer season (9.05 %), than winter (8.65 %) and monsoon (8.5 %). The percentage of total ash were found to be in the increasing order of leaves < bark < wood (Table No 1).The range of acid soluble ash content of leaves of the said plant was ranging from 4.75 % to 5.1 % among different seasons tested. Wood showed higher level of acid solubility of ash content (i.e. 7.05 % to 7.25 %). Highest level was recorded in summer season (7.25 %), than winter (7.2 %) and monsoon (7.05 %). Bark showed higher level of ash soluble at summer season (5.85 %), than winter season (5.75 %) and monsoon (5.7 %). The percentage of acid solubility of ash were found to be in the increasing order of the leaves < bark < wood (Table No 1). Acid insolubility of ash of leaves of the test plant was highest in summer season (1.7 %) as compared to monsoon (1.5 %) and winter (1.4 %). The range of percentage of acid insoluble ash of wood showed slight higher than leaves (1.4 % to 2.0 %). Bark showed reading in the range of (1.5 % to 1.7 %). In wood, acid insolubility ash showed higher level in summer season (2.0 %) than monsoon (1.4 %) and winter (1.45 %), while in bark of the tree highest acid insolubility of ash was recorded in summer season (1.7 %), than winter (1.6 %) and monsoon (1.5 %). The percentage of acid insoluble ash content were found to be in the increasing order of leaves < bark < wood .

***Terminalia bellerica* Roxb.**

It was generally observed that leaves and bark samples of *Terminalia bellerica* Roxb. collected in various seasons showed highest range of ash values of acid solubility, i.e. wood (11.55 % to 12.5%) and bark (11.1% to 11.35 %)

when compared to leaves (i.e. 7.1 % to 7.8 %) (Table No1). The percentage of total ash content of leaves showed highest level in summer season (7.8 %) as compared to winter (7.3 %) and monsoon (6.9 %). In bark of the same plant total ash content observed higher level at summer i.e. (11.35 %) as compared to winter (11.25 %) and monsoon (11.1 %), while in wood total ash ranges from 11.55 % to 12.5 %, highest level was observed at summer season (12.5 %) than winter (12.25 %) and monsoon (11.55 %). The percentage of total ash content were found to be in the increasing order of leaves < bark < wood. The acid soluble ash of leaves of test plant was measured, in summer season it was found, 6.0 % in winter season it was recorded 5.7 % and in monsoon it was found 5.6 %. In wood, acid soluble ash ranges from (9.05 % to 9.85 %), summer season showed higher acid solubility i.e. 9.85 %, as compared to other seasons. The bark showed acid soluble ash from 9.05% to 9.35%, higher being was observed in summer season (9.35 %) as compared to winter (11.25 %) and monsoon (11.1 %). The percentage of acid solubility of ash were found to be in the increasing order of leaves < bark < wood. In acid insoluble ash content of leaves of the test plant was measured, it was found highest in summer season (1.8 %) than winter (1.7 %) and monsoon (1.5 %). The bark showed acid insoluble ash content in the range of (1.95 % to 2.05 %), the higher level was observed in monsoon (2.05 %), as compared to summer (2.0 %) and winter (1.95 %) while in wood, there was found very low acid insolubility of ash in monsoon season (2.5 %) and high acid insolubility was found in the season of summer (2.65 %) and in the season of winter it was found (2.55 %). The percentage of acid insolubility was found in the increasing order of leaves < bark <wood.

***Terminalia chebula* Retz:**

The total ash content of leaves *Terminalia chebula* Retz. ranges from (7.85% to 8.4%) higher level being observed during summer season (8.4 %), than winter (8.0 %) and monsoon (7.85 %). In bark, total ash content was highest in the season of summer (11.35 %) which was compared to winter (11.3 %) and monsoon (11.1 %), while in wood, it was observed highest total ash content in the season summer (12.45 %) compared to monsoon (12.15 %) and winter (12.2 %). The percentage of total ash content were found to be in the increasing order of leaves < bark < wood (Table No 1). The acid solubility of ash of leaves of test plants ranges from (5.3 % to 5.75 %), where, in the season of monsoon and winter it was found approximately same content (5.3 %) and in summer season it was 5.75 %, which was highest. In bark, of the same plant, acid soluble ash ranges from (8.5 % to 8.7 %), maximum solubility observed at winter season (8.7 %), than monsoon and summer (8.5 %). Wood showed maximum acid solubility in summer season (9.6 %), than monsoon (9.4 %) and winter (9.3 %). The percentage of acid soluble ash content were found to be in increasing order of leaves < bark < wood (TableNo.1). The acid insoluble ash concentration of leaves of the test plant showed maximum at monsoon season (2.45 %) than winter (2.4 %) and summer (2.35 %). The acid insoluble ash content of bark ranges from (2.6 % to 2.85 %), maximum insolubility observed in summer season (2.85 %) than monsoon and winter season (2.6 %), while percentage of acid insolubility ash of wood was found highest in winter season (2.9 %), as compared to summer (2.85 %) and monsoon (2.75 %). The percentage of acid insoluble content were found to be in the increasing order of leaves < bark < wood.

***Terminalia catappa* Linn.-**

The total ash content of leaves of *Terminalia catappa* Linn. ranges from (8.8 % to 9.3 %), higher level of total ash content was observed in the season of summer (9.3 %) than winter (9.05 %) and monsoon (8.8 %) which was observed lowest, while bark show higher content of total ash in summer season, (11.65 %) compared to winter (11.35 %) and monsoon (11.0 %). In wood, the total ash content was highest in the season of summer (11.35 %) it was followed by winter (11.15 %) and monsoon (10.75 %).(Table No 1). Acid solubility of leaves of the same plant ranges from (6.1% to 6.65 %) higher level of acid solubility was observed at summer season (6.65 %) as compared to winter (6.45 %) and monsoon (6.1 %). The percentage of acid solubility of wood was high in the season of winter and summer (9.45 % and 9.4 %) respectively, which was followed by monsoon season (9.15 %). The percentage of acid solubility of bark was higher in winter (9.7 %) as compared to summer (9.35 %) and monsoon (9.25 %). The acid insolubility ash of leaves showed maximum solubility at monsoon (2.7%) followed by summer and winter (2.65 % and 2.6%) respectively. The percentage of acid insoluble ash of bark was higher in summer (2.3 %) as compared to monsoon (1.75 %) and winter (1.65 %). The wood show acid insolubility of ash in the range of (1.1 % to 1.95 %), where in the season of summer it was recorded highest (1.95 %) compared to season winter (1.7 %) and monsoon (1.1 %). The percentage of total ash, acid solubility of ash and acid insolubility of ash in the test plant studied were found to be in the increasing order as follows, regarding total ash, it was found leaves < wood < bark, in case of acid solubility of ash, the increasing order is like leaves< wood< bark and the increasing order of acid insolubility of ash was noted as wood <bark < leaves.

Table 1A: Determination of Ash values of 1) *Terminalia cuneata* Roth. 2)*Terminalia bellerica* Roxb. 3) *Terminalia chebula* Retz. and 4) *Terminalia catappa* Linn.

Plant parts	Season	Total ash (%)			
		Plant 1	Plant 2	Plant 3	Plant 4
Leaves	Summer	6.8	7.8	8.4	9.3
	Monsoon	6.25	7.1	7.85	8.8
	Winter	6.45	7.4	8.0	9.05

Wood	Summer	9.05	12.5	12.45	11.35
	Monsoon	8.5	11.55	12.15	10.75
	Winter	8.65	12.25	12.2	11.15
Bark	Summer	7.55	11.35	11.35	11.65
	Monsoon	7.2	11.1	11.1	11
	Winter	7.35	11.25	11.3	11.35

Table B Determination of Ash values of 1) *Terminalia cuneata* Roth. 2) *Terminalia bellerica* Roxb. 3) *Terminalia chebula* Retz. and 4) *Terminalia catappa* Linn.

Plant parts	**Season**	**Acid soluble (%)**			
		Plant 1	**Plant 1**	**Plant 2**	**Plant 3**
Leaves	Summer	6.8	5.1	6.0	5.75
	Monsoon	6.25	4.75	5.6	5.3
	Winter	6.45	5.05	5.7	5.3
Wood	Summer	9.05	7.25	9.85	9.6
	Monsoon	8.5	7.05	9.05	9.4
	Winter	8.65	7.2	9.7	9.3
Bark	Summer	7.55	5.85	9.35	8.5
	Monsoon	7.2	5.7	9,05	8.5
	Winter	7.35	5.75	9.3	8.7

Table 1C: Determination ofAsh values of 1) *Terminalia cuneata* Roth. 2)*Terminalia bellerica* Roxb. 3) *Terminalia chebula* Retz. and 4) *Terminalia catappa* Linn.

Plant parts	**Season**	**Acid insoluble (%)**				
		Plant 1	**Plant 1**	**Plant 2**	**Plant 3**	**Plant 4**
Leaves	Summer	6.8	1.7	1.8	2.35	2.65
	Monsoon	6.25	1.5	1.5	2.45	2.7
	Winter	6.45	1.4	1.7	2.4	2.6
Wood	Summer	9.05	2.0	2.65	2.85	1.95
	Monsoon	8.5	1.4	2.5	2.75	1.1
	Winter	8.65	1.45	2.55	2.9	1.7
Bark	Summer	7.55	1.7	2.0	2.85	2.3
	Monsoon	7.2	1.5	2.05	2.6	1.75
	Winter	7.35	1.6	1.95	2.6	1.65

4. References

1. Anonymous, (**1966**) Pharmacopoeia of India. New Delhi, Government of India
2. Anonymous, (**1973**) British Pharmacopoeia by her Majesty stationary office, London, U.K.
3. Azaizeh, H., Fulder, S., Khalil, K., Said, O., Ethno-medicinal knowledge of local Arab practitioners in the Middle East Region. *Fitoterapia*, **2003**, 74: 98-108.
4. Hansel, R. Medicinal plants and empirical drug research in Swain, T. (Eds) Plants in the development of modern medicine, *Harvard University Press. Boston*, **1972**, pp. 161-174.
5. Indrayan, A.K., Sharma, S., Durgapal, D., Kumar, N., and Kumar, M., (**2005**), Determination of nutritive value and analysis of mineral elements for some medicinally valued plants from Uttaranchal. *Current Science* 89, pp.1252-1255.
6. Kadam V.B., Salve Sunanda B. and Wadikar M.S. Biochemical evaluation of ash value of some medicinal plants of genus *Terminalia* (Combretaceae) of Marathwada region in Maharashtra. *Int. J. of Medicine and Pharmaceutical Research*, **2014**, 2(5): 776 – 780.
7. Lin, T.C. and Hsu, F.L.Tannin and related compounds from *Terminalia catappa, Darviflora*, *J. Chin.Chem. Soc*., **1999**, 45(4).
8. Mitscher, L.A., Park, Y.H., Clark,D, Antimicrobial agents from higher plants, antimicrobial flavonoids

and related substances from *Glycyrhiza glabra*. *Journal of Natural Products*. **1980**, 43:259-269.

9. Nudrat, Z., Sayed and Usha Munkundan., (**2005**), Medicinal and aromatic plants of India Part I, In: Khan and Khanum, a (Eds).Ukaaz Publication, Hyderabad.
10. Principe, P.E., (**1991**), valuing the biodiversity of medicinal plants.
11. Resenthalar, L. **1930**: The Chemical investigation of plants G. Bell and Sons Ltd., London.
12. S.S. Tambe, Shailaja Deore, Sumia Fatima and V.B. Kadam. Determination of ash value of some medicinal plants of Marathwada region in Maharashtra. *Int. J. of Pharmaceutical Research and Biosciences*, **2012**, 1(3): 337-346.