Research Article CODEN: IJPRNK ISSN: 2277-8713
VB Kadam, IJPRBS, 2015; Volume 4(1): 75-80 IJPRBS

INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

DETERMINATION OF SOLUBLE EXTRACTIVES OF SOME MEDICINAL PLANTS OF GENUS *TERMINALIA* (COMBRETACEAE) OF MARATHWADA REGION IN MAHARASHTRA

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Accepted Date: 14/12/2014; Published Date: 27/02/2015

Abstract: The seasonal variation of water soluble extractive, alcohol soluble extractive and ether soluble extractive have been investigated in leaves, wood and bark of *Terminalia cuneata Terminalia bellerica, Terminalia chebula* and *Terminalia catappa*. Comparative account of water soluble extractive of leaves, wood and bark of *Terminalia catappa* was showed high level (range from 5.15 to 7.5 %) than *Terminalia cuneata* (range from 3.2 to 5.8 %) , *Terminalia bellerica* (range from 4.25 to 6.6 %) and *Terminalia catappa* (range from 3.15 to 4.8 %) in all seasons. Alcohol soluble extractive of leaves of *Terminalia bellerica* showed higher (range from 7.2 to 7.65 %) and lower in wood of *Terminalia chebula* (range from 4.2 to 4.45 %). Ether soluble extractive of leaves of *Terminalia catappa* showed higher (range from 4.9 to 5.25 %) and lower in wood of *Terminalia chebula* (range from 3.75 to 4.05 %).

Keywords: Water, Alcohol and Ether soluble extractive, Medicinal plant, *Terminalia*

PAPER-QR CODE

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Access Online On:

www.ijprbs.com

How to Cite This Article:

VB Kadam, IJPRBS, 2015; Volume 4(1): 75-80

INTRODUCTION

Man has been depending on plants since time immemorial for the most of his basic needs like food, clothing, shelter, medicines etc. Many plants have been used in the cure and control of disease, but their medicinal properties are yet to be more thoroughly and scientifically studied for their proper utilization. In the beginning, drugs were prepared from the plant parts in the crude form and used as decoction, poultice, paste etc., but with the advancement of science and technology, the therapeutically active principles of several drugs have been isolated for medicinal use (Tambe et.al.,2012). Since the beginning of human civilization plants have been used as one of the most important sources of medicine. In spite of tremendous development in the field of allopathy, plants still form one of the major sources in the modern as well as traditional medicine throughout the world. India is storehouse of medicinal plants. About 70% of rural folk depends on medicinal plants for their health care therefore now a day's much attention is being paid to the utility and development of plant and to study their medicinal properties (Momin and Kadam, 2012). In this respect plants need conservation for their potentials, valuable properties which they contain medicinal plants have been used as traditional 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). Medicinal plants continue to be an important therapeutic aid for the ailments of humankind.

India contains a great wealth of biological diversity in its forests (Botanical survey of India, 1983). The forest in India is the principal repository of large number of medicinal and aromatic plants which are largely collected as raw materials for manufacture of drugs and perfumery products. According to Patil, and Gaikawad, (2011), the bark of *Terminalia arjuna* is potent cardio tonic in the Ayurveda. The bark was analyzed with respect to reducing sugars, total sugars, amylose, amylopectin, starch, crude fibers and crude protein, total ash value, total flavonoids, total alkaloids, nitrates and total oxalate. Rajeev Nema *et.al.* (2012) did preliminary phytochemical evaluation and flavonoids quantification of *Terminalia arjuna* leaves extracts. Stem, bark and leaves possess glycosides, large quantities of flavonoids have been found to possess antioxidant, anti-inflammatory and lipid lowering effects to them where as glycosides are cardio tonic. Shanmugasundaram *et.al*. (2011), scientifically validated the purification method of *Terminalia chebula* in Siddha medical practice in India. Gyawali and Kyong- su- kim, (2011) were isolated volatile organic compounds from *Terminalia chebula*. Manikandan and Rejula, (2008), identified the leaf extract contains more quantity of hydro Quinone , trans-cinnmic acid, gentistic acid, vanillic acid, syringic acid and transfernlic acid known as allelochemical and they says that *Terminalia chebula* will be extremely useful in feature to

control the weed growth in agro ecosystem. The fruits of the tree *Terminalia bellirica* are traditionally useful in the cure of Bronchitis, sore throat and inflammation of eyes.

Terminalia cuneata Roth*, Terminalia bellerica* Roxb*. Terminalia chebula* Retz*.* and *Terminalia catappa* Linn. are most important plants from the family Combretaceae. All these plants contain chemical ingredients of a great importance in medical care, in agriculture and they have their great importance in physiology, biochemistry and even in taxonomy also (Kadam et.al. 2013). Physiologically every plant species would have its own chemical profile. Chemicals present in the plant material could be dissolved in different solvent for the purpose of further analysis therefore, for the present investigation three solvents i.e. water, alcohol and ether were selected to determine the soluble substance and this was again carried out in three seasons, i.e. summer, monsoon and winter continuously for two years.

MATERIALS AND METHODS

***Determination of Water-Soluble Extractive -**1gm of air dried drug, coarsely powered was macerated with 100ml distilled water in a closed flask for 24 hours shaking frequently. Solution was filtered and 25ml of filtered was evaporated in a tarred flat bottom shallow dish, further dried at 100^0C and weighed. The percentage of water soluble extractive was calculated with reference to the air dried drugs.

***Determination of Alcohol-Soluble Extractive**- 1gm. of air dried drugs, coarsely powdered was macerated with 100ml alcohol in closed flask for 24 hours with frequent shaking. It was filtered rapidly taking precaution against loss of alcohol. 25ml of filtrate was then evaporated in a tarred flat bottom shallow dish, dried at 100^0C and weighed. The percentage of alcohol soluble extractive was calculated with reference to the air dried drugs.

***Determination of Ether-Soluble Extractive-** 1gm. of air dried drugs, coarsely powdered was macerated with 100ml ether in closed flask for 24 hours with frequent shaking. It was filtered rapidly taking precaution against loss of ether. 25ml of filtrate was then evaporated in a tarred flat bottom shallow dish, dried at 100^0C and weighed. The percentage of ether soluble extractive was calculated with reference to the air dried drugs.

Results and Discussion

***Terminalia cuneata* Roth.-**The summer collection of leaves showed higher content (5.8%) of water soluble extractive as compared to winter (5.45%) and monsoon (5.15%). However the samples of bark exhibited higher contain at summer season (4.8%) as compared to winter and monsoon season (Table No.1). In wood, summer season showed high content of extractive (3.6%) as compared to winter (3.35%) and monsoon (3.2%). In summer collection of leavers (6.7%), bark (5.6%) and wood (4.6%) appeared significantly at 10% higher for alcohol soluble

extractive over of monsoon and winter (Table No.1). The range of ether soluble extractive in leaves ranged from 4.4 % to 4.8 % highest concentration being observed during summer season (4.8%). Ether soluble extractive of bark showed the ranges of (4.3% to 4.85%) for three seasons tested. In the summer season, higher content was observed i.e. 4.85%. The wood seemed to be having the range (3.25% to 3.85%) of concentrations in all seasons. When ether soluble extractive compared to leaves and bark during two seasons examined. Generally it was observed that, the leaves in season summer showed (4.8%) in wood summer (3.85%) and bark (4.85%) showed significantly higher percentage of ether soluble extractive. The range of extractive percentage in water, alcohol and ether were found wood < bark< leaves. (Table No.1)

***Terminalia bellirica* Roxb.-**The water soluble extractives from leaves were comparatively raised in summer (6.6%) over that of winter (6.45%), monsoon (6.25%). In wood 4.25% to 4.65% of soluble extractive percentage was found during the different seasons tested. Higher percentage was found during summer (Table No. 5b). In bark extractive percentage range from 4.85% to 5-35% summer showed higher (5.35%) as compared to monsoon (4.85%) and winter (5.1%). Leaves extracted with alcohol showed the concentration of 7.2% to 7.65 % during various seasons tested (Table No.1), at higher level 7.65% in alcohol solution extractive was found the winter bark acuminated maximum levels of soluble matter (i.e. 5.15%) over that of summer (5.7%) and monsoon (4.7%) the wood seemed to be comparatively low of alcohol. The amounts of ether soluble extractives are comparatively lower than that of the alcohol and water soluble extractives (Table No. 1). The ether soluble extractive percentage in leaves ranged from 5.4% to 5.15% in the bark, the ether soluble extractive was found maximum at winter (4.7%) as compared to summer (4.65%) and monsoon 4.35%, the wood exhibited percentage of ether soluble extractive (3.3% to 3.8%). The range of water, alcohol and ether, soluble extractives were found to be in increasing order of wood < Bark <leaves (Table No.1).

***Terminalia chebula* Retz.-** The water soluble extractive content was measured in the leaves of said plant for three seasons of two years continuously. (Table No 1), and it was found that, the leaves stored (4.8%) of extractives during summer, when compared to monsoon (4.25%) and winter (4.5 %). Similarly, the bark of the tree during summer was able to maintain higher levels of soluble extractives. During summer season (3.85%) over than the season of winter (3.55 %) and monsoon season (3.25%), the wood showed comparatively low percentage of water soluble matter as compared to leaves and bark, it ranges from (3.3% to 3.45%) where summer showed higher percentage (3.45%) that monsoon (3.15%). The alcohol soluble extractive studies were conducted in different seasons of two year period showed that, the summer collection of leaves and bark were the richest source of alcohol soluble matter (5.9% and 4.8%), when compared to other seasons . Like water extractive of wood, the alcohol soluble matter of wood had low concentration among other plant parts tested in various seasons. It was

commonly observed in ether extractive percentage that the leaves showed higher concentration i.e. 4.55% of ether soluble extractive than that of bark i.e. 4.3%, wood showed 4.5%. Bark had comparatively showed low level of ether soluble extractive that was found in the range of 3.95 % to 4.3%, the range of water alcohol and ether soluble extractive were

found to be in the increasing order of bark < wood < leaves (Table No.1) .

***Terminalia catappa* Linn.-** The water soluble extractive content was measured in leaves of test plant for three seasons continuously for two years (Tables No 1) and it was found that, the leaves stored 7.5% of extractives during summer. When compared to monsoon (7.05%) and winter (7.25 %) similarly, bark in the season of summer were able to maintain higher level of water soluble extractives during summer (6.5%) over then other seasons .The alcohol soluble extractive studies conducted in different seasons of two years in leaves ranges from (7.3 % to 7.15%), when compared to other seasons like water extractive of wood, the alcohol soluble matter of wood had low concentration among other plant parts tested in various seasons, it was commonly observed in ether extractive percentage that the leaves and wood showed higher concentration (5.25 % 4.55%) of ether soluble extractive over bark. (Table No. 1). The bark comparatively showed level of (3.95% to 4.55%) of ether soluble extractive. The range of water, alcohol and ether soluble extractives were found to be in the increasing order of bark < wood < leaves (Table No.1).

Table No. 1- Determination of extractive percentage of Terminalia cuneata Roth. , Terminalia bellerica Roxb.,

Plant parts	Seasons	Water soluble extractive (%)				Alcohol soluble extractive (%)				Ether soluble extractive (%)			
		Plant 1	Plant 2	Plant 3	Plant 4	Plant 1	Plant 2	Plant 3	Plant 4	Plant 1	Plant 2	Plant 3	Plant 4
Leaves	Summer	5.8	6.66	4.8	7.5	6.7	7.65	5.9	7.7	4.8	5.6	4.55	5.25
	Monsoon	5.15	6.25	4.25	7.05	6.25	7.2	5.2	7.15	4.4	5.15	4.25	4.9
	Winter	5.45	6.45	4.5	7.25	6.4	7.3	5.45	7.3	4.65	5.4	4.4	5.05
Wood	Summer	3.6	4.65	3.45	5.55	4.65	5.25	4.3	6.35	3.85	3.8	4.05	4.8
	Monsoon	3.2	4.25	3.15	5.15	4.2	4.65	4.2	6.05	3.25	3.3	3.75	4.55
	Winter	3.35	4.5	3.3	5.3	4.4	4.8	4.45	6.4	3.45	3.45	4.0	4.25
Bark	Summer	4.8	5.35	3.85	6.5	5.65	5.7	4.8	6.7	4.85	4.65	4.3	4.55
	Monsoon	4.2	4.85	3.25	6.05	5.25	4.7	4.05	6.4	4.3	4.35	3.95	3.95
	Winter	4.55	5.1	3.55	6.2	5.45	5.15	4.3	6.15	4.55	4.7	4.25	4.35

Plant 1- Terminalia cuneata , Plant 2- Terminalia bellerica , Plant 3- Terminalia chebula and Plant 4- Terminalia catappa

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