Biochemical Profile of Azadirachta indica A. Juss. and Melia azedarach Linn.

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ABSTRACT

The medicinal plants have been used for years in daily life to treat diseases all over the world. Azadirachta indica and Melia azedarach are very useful traditional medicinal plant in the sub-continent. Each part of the trees has some medicinal properties. The aim of the study was to investigate the seasonal variations of biochemical compounds (alkaloids and lipid) in the leaves, stem and bark of Azadirachta indica and Melia azedarach. Comparative account of alkaloid contents of leaves of Azadirachta indica showed higher (range 2.682 mg/g dry wt. to 2.957 mg/g dry wt.) than Melia azedarach (range 2.297 mg/g dry wt. to 2.674 mg/g dry wt.). Comparative account of lipid contents of leaves, stem and bark of Azadirachta indica showed higher (range 14.428 mg/g dry wt. to 35.416 mg/g dry wt.) than Melia azedarach (range 12.297 mg/g dry wt. to 25.915 mg/g dry wt.)

Key words: Alkaloids, lipid, Azadirachta indica and Melia azedarach.

INTRODUCTION

Medicinal plants are used in traditional treatments to cure variety of diseases. In the last few decades there has been an exponential growth in the field of herbal medicine. The world is rich with natural and unique medicinal plants. Medicinal plants are now getting more attention than ever because they have potential of myriad benefits to society or indeed to all mankind, especially in the line of medicine and pharmacological. The medicinal value of these plants lies in bioactive phytochemical constituents that produce definite physiological action on the human body (Akinmoladun et al., 2007). Some of the most important bioactive phytochemical constituents are alkaloids, essential oils, flavonoids, tannins, terpenoid, saponins, phenolic compounds and many more (Edeoga et al., 2005). Phytochemical is a natural bioactive compound found in plants, such as vegetables, fruits, medicinal plants, flowers, leaves and roots that work with nutrients and fibers to act as an defense system against disease or more accurately to protect against disease. Phytochemicals are divided into two groups, which are primary and secondary constituents; according to their functions in plant metabolism. Primary constituents comprise common sugars, amino acids, proteins and chlorophyll while secondary constituents consists of alkaloids, terpenoids and phenolic compounds (Krisahnaiah et al., 2007).
Neem has a vital role in various problems associated with human health. The chemical constituents present in the neem plant makes it a doctor tree due to its wide scope in biological activities associated with it, and has become a global context today. Neem has been extensively used in Ayurveda, Unani and Homoeopathic medicine and has become a centre of attraction of modern medicine. The *Azadirachta indica* (Neem) Tree is an incredible plant that has been declared the Tree of the 21st century by the United Nations (Puri, 1999). In India, it is commonly known as ‘Divine Tree’, ‘Life giving tree’, ‘Nature’s Drugstore’, ‘Village Pharmacy’ and ‘Panacea for all diseases’ (Shoforowa, 1993). Neem has extensive utilization in Ayurveda, Unani and Homeopathic medicine (Kausik et al, 2002 and Girish & Shankara, 2008). The Chemical constituents of Neem contain many bioactive compounds including alkaloids, flavonoids, triterpenoids, phenolic compounds, carotenoids, steroids and ketones. Azadirachtin is a mixture of seven isomeric compounds (Verkerk & Wright, 1993). To clean wounds, soothes, swellings and erases skin problems, boiled Neem is used. Neem leaves have been demonstrated to have vast properties like as immunomodulatory, antiinflammatory, antihyperglycaemic, antiulcer, antimalarial, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic (Hoque et al, 2007). Barks of Neem can be used to make toothbrush and the roots has an ability to heal diseases and against insects. The seed of Neem tree has a high concentration of oil. Neem oil is widely used as insecticides, lubricant, drugs for variety of diseases such as diabetes and tuberculosis (Puri., 1999; Elvin-Lewis., 1980; Kumar., *et al*., 2009).

*Melia azedarach* L. (Family: Meliaceae) is a deciduous tree that is native to northeastern India. It has several common names such as, White cedar, Persian lilac, Tulip cedar and Chinaberry. The exuded gum obtained from *Melia azedarach* trunk is considered useful in spleen enlargement, wood extract given in asthma (Dhiman , 2003). Decoction of bark is prescribed in paroxysmal fever to relive thirst, nausea, vomiting and general debility, and loss of appetite and skin diseases (Dhiman , 2003). Poultice of the leaves are applied to relieve nerve headache and to cure eruption on the scalp. Leaf juice is act as anthelmintic, diuretic, emmenagouge, expectorant, vermifuge and their decoction is astringent, stomachic, used in hysteria, leprosy, scrofula (Dhiman , 2003 ; Sharma et.al., 2001 ). Flowers have astringent, anodyne, refrigerant, emmenagouge, diuretic, resolvent, deobsturent properties (Warrier et.al., 1995). Fruits are considered anthelmintic, diuretic, emollient and purgative also, prescribed internally in indigestion, colic and intestinal catarrh ( Rani et.al., 1999) Seeds are considered anthelmintic, expectorant, aphrodisiac and are useful in typhoid fever, helminthiasis, pain in the pelvic region and scrofula, also prescribed in rheumatism. Seed oil is used in skin diseases. Roots are astringent, emmenagouge, anodyne, febrifuge, expectorant, constipating. These are useful in sciatica, lumbago, piles, cough, asthma, ulcers, wounds, diabetes, intermittent fever, post labor pain in uterus, amenorrhea and in leuoderma (Warrier et.al., 1995).

Thus, as the experimental plant species possess immense medicinal properties, therefore the aim of the present study is to estimate the biochemical compounds of *Azadirachta indica* and *Melia azedarach*. 
MATERIALS AND METHODS

1) Alkaloids - Quantitative estimation of alkaloids was carried out by following the method of Sairam and Khanna (1971). Each sample was ground to fine powder, for each 1 gm. 0.75ml, 25% ammonium hydroxide, 1ml, 95% ethyl ether were added. The material was allowed to macerate for 12 hours and dried. The dried material was extracted with chloroform for 24 hours in a Soxhlet apparatus, and the extract obtained was evaporated to dryness and the residue was mixed with 2.5ml, 0.1ml Methanol (90%) HCL. The extract, thus obtained was centrifuged to take supernatant and discard pellet. The solution evaporated and the total alkaloids were weight after drying at 1000C.

2) Lipid (oil) - For the estimation of lipid, the method of Agrawal et. al. (1987) was followed. The material was dried for 12-17 hours at 60-70 0C and grand to a coarse powder 0.5gm.of weighed sample was taken in a cellulose thimble. The thimble was fixed in the Soxhlet funnel and about 150–200ml of petroleum ether was taken in the flat bottom flask (FBF). The funnel over the flask was fixed and attached to the water condenser. Refluxed for at least 4 hours and the heater were switched off to let the apparatus cool. Condenser and funnel were detached, petroleum ether was evaporated the flask, transferred it in weighed beaker (W1) of 50 or 100 ml. Rinsed the FBF twice with transferred in an oven at 70 0C till either evaporated (presence of ether can be detected by its smell). The beaker was cooled in a desiccator and weight (W2) Difference of (W1 – W2) would give the oil content. The oil percentage was calculated on the basis of the weight of plant material.

RESULTS AND DISCUSSION

The alkaloid content of leaves of Azadirachta indica was higher (2.957 mg/g dry wt.) in summer over than winter (2.810 mg/g dry wt.) and monsoon (2.682 mg/g dry wt.). The range of alkaloid content of bark of Azadirachta indica was noted from (1.117 mg/g dry wt. to 1.294 mg/g dry wt.). The range of alkaloid content in stem was from (1.742 mg/g dry wt. to 1.945 mg/g dry wt.) and shows higher in summer. The alkaloid content of Azadirachta indica showed increasing order of bark < stem < leaves (Table No. 1 and Graph No. 1). The alkaloid content of leaves of Melia azedarach was higher (2.674 mg/g dry wt.) in summer over than winter (2.584 mg/g dry wt.) and monsoon (2.297 mg/g dry wt.). The range of alkaloid content of stem was noted from (1.805 mg/g dry wt. to 2.198 mg/g dry wt.). The range of alkaloid content in bark of Melia azedarach was from (1.312 mg/g dry wt. to 1.623 mg/g dry wt.) and shows higher in summer. The alkaloid content of Melia azedarach showed increasing order of bark < stem < leaves (Table No. 1 and Graph No. 1).

The lipid content of leaves of Azadirachta indica was 37.695 mg/g dry wt. in summer, 36.063 mg/g dry wt. in winter and 35.416 mg/g dry wt. in monsoon. Higher being observed during summer i.e. 37.695 mg / g dry wt. The range of lipid content in stem of Azadirachta indica from 16.935 mg/g dry wt. to 20.132 mg/g dry wt. Maximum concentration of lipid was noted during summer 37.695 mg/g dry wt. The range of lipid content of bark of Azadirachta indica from 14.428 mg/g dry wt. to 15.321 mg/g dry wt. Generally, the concentration of lipid were found to be in increasing order of bark < stem < leaves (Table No. 1 and Graph No. 1). The lipid content of leaves of Melia azedarach was 29.581 mg/g dry wt. in summer, 28.488 mg/g dry wt. in winter and 25.915 mg/g dry wt. in monsoon. Higher being
observed during summer i.e. 29.581 mg / g dry wt. The range of lipid content in stem of *Melia azedarach* from 20.642 mg/g dry wt. to 22.421 mg/g dry wt. Maximum concentration of lipid was noted during winter 22.421 mg/g dry wt. The range of lipid content of bark of *Melia azedarach* from 11.103 mg/g dry wt. to 12.297 mg/g dry wt. Generally, the concentration of lipid were found to be in increasing order of bark < stem < leaves (Table No.1 and Graph No.1).

Table No.1- Seasonal variation of alkaloids and lipid content of different plant parts of *Azadirachta indica* A. Juss. and *Melia azedarach* Linn.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Plant Parts</th>
<th>Season</th>
<th>Alkaloids (Mg / g dry wt.)</th>
<th>Lipid (Mg / g dry wt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Azadirachta indica</em></td>
<td><em>Melia azedarach</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Melia azedarach</em></td>
<td><em>Melia azedarach</em></td>
</tr>
<tr>
<td>1</td>
<td>Leaves</td>
<td>Monsoon</td>
<td>2.682</td>
<td>2.297</td>
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<td></td>
<td></td>
<td>Winter</td>
<td>2.810</td>
<td>2.584</td>
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<tr>
<td></td>
<td></td>
<td>Summer</td>
<td>2.957</td>
<td>2.674</td>
</tr>
<tr>
<td>2</td>
<td>Stem</td>
<td>Monsoon</td>
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<td>Winter</td>
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<tr>
<td></td>
<td></td>
<td>Summer</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Summer</td>
<td>1.294</td>
<td>1.624</td>
</tr>
</tbody>
</table>

Graph No.1- Seasonal variation of alkaloids and lipid content of different plant parts of
Azadirachta indica A. Juss. and Melia azedarach Linn.

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