



CONSERVATION, PHYTOCHEMICAL CHARACTERIZATION AND PHARMACOLOGICAL EVALUATION OF THE ENDANGERED TREE SPECIES *ATUNA INDICA* AND *ATUNA TRAVANCORICA* (CHRYSOBALANACEAE)

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ABSTRACT

The present review article highlights the importance of phytochemical screening and therapeutical evaluation among unidentified angiosperms in treating chronic degenerative diseases and it also describes the relevance of the endangered tree species *Atuna indica* and *Atuna travancorica* with regard to therapeutics.

Key words: Free radical scavenging activity, Umbelliferone, Alphaelaostearic and Parinaric acids.

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INTRODUCTION

The miraculous 1600 KM long mountain chain, the Western Ghats runs along the west coast of India accommodates about more than thirty percent of diverse species of plants and animals constitute less than six percent of the land area of India (Pascal *et al.*, 2004; Kamal *et al.*, 2007). It is also noticed that the Western Ghats are also gifted with endemic of the diverse species present since it contributes to sixty three percent of the evergreen tree species (1500 flowering Plants) that are found in India. Endemic and Biodiversity characteristics of Western Ghats categorized it as a global biodiversity hotspot as well as one of the natural world heritage sites by the UNESCO. Here the species richness and biodiversity directly proportional to the prevalence of favorable climatic conditions in the particular region of Western Ghats.

As seen in the case of Southern Western Ghats which is the richest floristic cum endemic biodiversity region among the different geographical locations of Western Ghats. Among the different regions of Southern Western Ghats, Kerala being a species rich part harboring more than 4500 flowering plants out of which 35 percent are endemic and 10 percent are threatened and tree forms. Similarly, more than 1000 tree species of which 32 percent are endemics and 17 percent as threatened (Somen *et al.*, 2014; Volga *et al.*, 2013; Harini *et al.*, 2003; Norman M, 2003; Nayar *et al.*, 2008; Community Agrobiodiversity, 2007; Manoj *et al.*, 2006; Sankara *et al.*, 2016; Arundhati *et al.*, 2016; Ratheesh *et al.*, 2012; Floristic diversity of Shendurany wild life Sanctuary, 1999).

The existence of illness date back to the beginning of the mankind and similarly the search for remedies being equally old as seen in Rigveda (3000 BC) that advocates various medicinal preparations of plants and mineral origin. According to the Hadith which was narrated by Imam Muslim and others, the Prophet, Peace and Blessings of Allah be upon Him, said: "For Every disease there is a cure; if the right medicine is applied, it will be healed by the leave of Allah". This encourages us to look for suitable remedies with which to treat sickness. We better know that

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still there is a sorrow from the poor ill family of the mankind due to the severe diseases such as Advanced Cancer (Metastatic Cancer), Heart diseases, CNS diseases, Liver diseases such as Early Chronic Cirrhosis and Chronic Active Hepatitis, Auto immune diseases, Mental illness and Chronic Obstructive Pulmonary Disease. The important thing is that all these patients showed poor response to treatment with modern medicine in common. We know that, until the early 20th Century, therapeutically potent drugs such as Digitalis, Atropine, Morphine, Ergot and Quinine were of Plant origin and still Pharmaceutical Scientist derive therapeutically useful leads from plant sources. All the above facts points to the need of innovative research for the left phytochemical treasure on the earth which can strengthen and broaden the scope of therapeutics, to serve for the poor ill community of the mankind (Satoskar *et al.*, 2015; Ahmed *et al.*, 2010; Remington).

Southern Western Ghats(India) Species of *Atuna*

The two species of *Atuna* distributed in the Southern Western Ghats are *Atuna indica* (Bedd.)Kosterm and *Atuna travancorica* (Bedd.)Kosterm. The specimens of *Atuna indica* were collected from Malabar wild life Sanctuary, Kakkayam, Calicut and it was first collected by Beddomei¹⁸ from Carcoorghats of Wayanad, and it was the rediscovery of this species, about 150 years later. Similarly *Atuna travancorica* was described based on Hooker's collection¹⁸ and also found in places near to Peringathur Dam in Thrissur, District of Kerala. The taxonomical as well as morphological characterization of the species was clearly done (Sasidharan and Sujanalpal, 2011). *Atuna indica*, a 20m tall tree with smooth, thin, brown bark having elliptic-oblong or elliptic ovate leaves with 17-21cm long and 5.5-7.5cm wide with white flowers. Similarly in the case of *Atuna travancorica* 25m tall tree with smooth thin grayish brown bark having alternate, lanceolate leaves with 7-16.5cm long and 1.7-4.5cm wide with pale lavender or white flowers. A unique feature of the family (Chrysobalanaceae) is seen such as they are prominently keeled (Ghillelan *et al.*, 2003; Flowering Plants, 1989).

Atuna indica

Flowering and Fruiting : November to February

Habitat : West Coast tropical evergreen forests (Western Ghats in India)

Atuna travancorica

Flowering and Fruiting : January to May

Habitat : West Coast tropical evergreen forests, usually riparian (Southern India, Travancore region)

Both the species are belonging to the endangered category (Sudhakar *et al.*, 2007; Sasidharan N, 2002; Malin *et al.*, 2015; Jean *et al.*, 2003; Mruthika, 2009)

Specimen Examined

Atuna indica, Kerala, Malabar Wild Life Sanctuary, Kakkayam Dam, 23.10.2016 Sayyidjasim CU143967.

The Phytochemical Studies and Pharmacological Importance

During the past decades the Phytochemical studies or the chemical knowledge about the family Chrysobalanaceae was scanty as seen in the case of *Atuna* species with the following known chemical Characters:-

- Leaves contains accumulation of silica(SiO₂), similarly every ray cell of the wood contains one globular silica inclusion.
- The flavonoid patterns of the leaf dominated by the flavonolsquercetin and kaempferol.
- The conjugated Trienoic and tetraenoic C₁₈-acids such as alphaelaostearic and parinaric acids are present as major fatty acids in the seed oils – An important notable chemical character.
- The free radical scavenging activity of *Atuna indica* was found to be therapeutically high which is clear from the percentage of total phenols and total flavonoids.
- High percentage of the therapeutical moiety Umbelliferone, a powerful antioxidant agent in this plant species requires special focus with regard to novel therapeutics (Sudhakar *et al.*, 2007; Sasidharan N, 2002; Malin *et al.*, 2015; Jean *et al.*, 2003; Mruthika, 2009; Global Forest Resources Assessment update 2005; Asish *et al.*, 2013; Sasidharan, 2003; IUCN, 2006).

Fig 1. *Atuna indica*(Bedd.) Kosterm – The Whole Plant

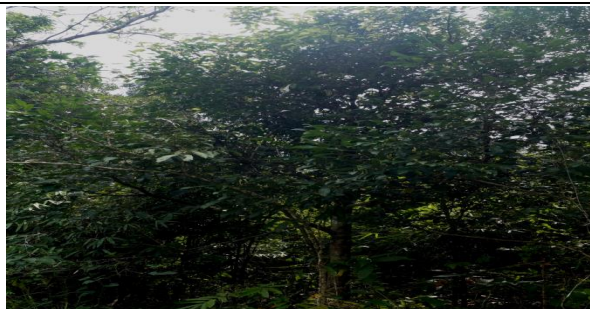
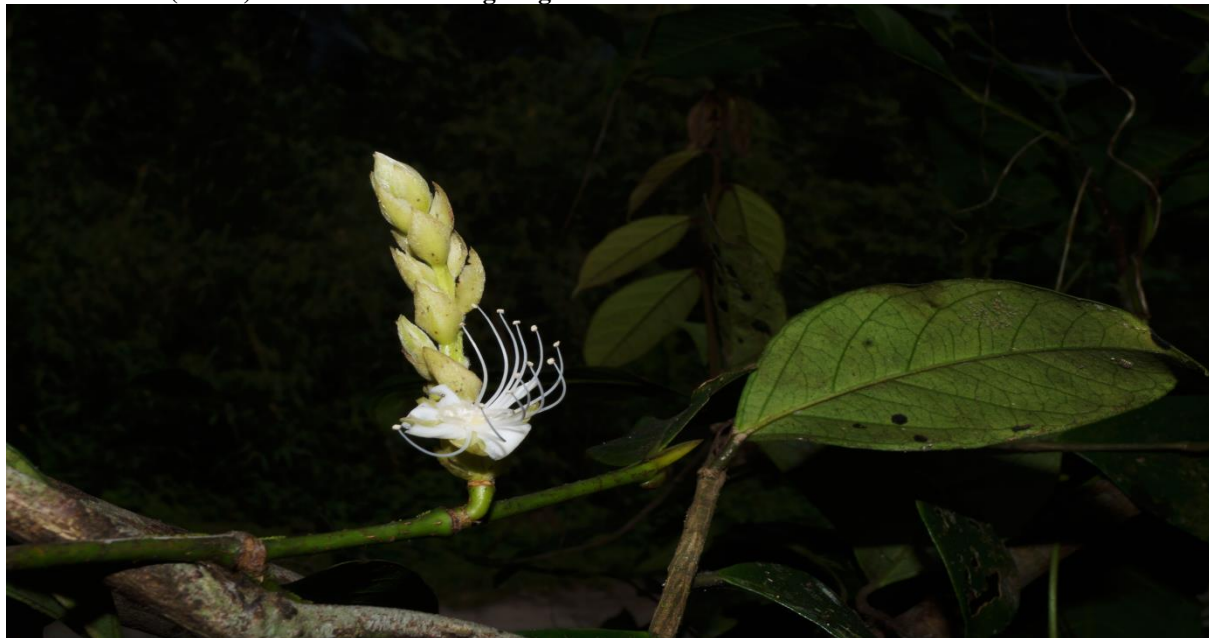


Fig 2. *Atuna indica* (Bedd.) Kosterm.: Flowering twig with flower

Place of Research

The Research study was carried out in the In House R&D of Kerala State Drugs and Pharmaceuticals Ltd, Alappuzha, Kerala State, which was established in the year 1976. This division is approved by Department of Science and Technology Govt. of India. This approval enables us to avail import duty exemption in the import of analytical equipment's and raw materials. Also this division is recognized by the University of Kerala for carrying out research works leading to PhD degree. Apart from this the future research scope in *Atuna indica* and *Atuna travancorica* species can be carried out in the Phytochemistry Division, Centre for Medicinal Plants Research-AVS Kottakkal, Chenguvatty-676503; prior to approval.

CONCLUSION

In these days in order to control the major diseases of the world, relaying on synthetic pharmaceutical

products is not enough since they cannot expand or alter their therapeutically potential. Due to these limitations there is need to discover new molecular structures and naturally every contributor moves to the plant kingdom in search of novel therapeutic moiety, also the endangered category of plants have to be conserved for preserving its Phytochemical treasure. From an ecological stand point, angiosperms are of an important and the largest group of plants that contributes primary organic matter and main resources for human population. So a logical approach towards the exploration for the therapeutically potent moieties in unidentified angiosperms will be a worth full therapeutic contribution to the human population. In this review about the angiosperm species *Atuna*, it has been found that a special therapeutic interest must be given for its *free radical scavenging* as well as *antioxidant activities* which may contribute for curing many life threatening diseases such as Cancer, Type 2 diabetes, etc.,

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