

## Gardening of *Elaeocarpus* (Rudraksha) for conservation and tourist interest in Andaman & Nicobar Islands

T.V.R.S. Sharma<sup>1\*</sup>, I. Jaisankar<sup>1</sup>, Jay Kumar<sup>2</sup> and M. Punnam Chander<sup>3</sup>

<sup>1</sup>Central Island Agricultural Research Institution, Port Blair – 744105

<sup>2</sup>Jawaharlal Nehru Rajkeeya Mahavidyalaya, Port Blair – 744101

<sup>3</sup>Regional Medical Research Centre (ICMR), Port Blair – 744103

\*Corresponding Author: Dr. T.V.R.S. Sharma

Central Island Agricultural Research Institute, Port Blair-744 101, Andaman, India

Email: sharmatvrs@gmail.com

### Abstract

A thought was put on plan to have an *Elaeocarpus* garden at least three different places in Andaman and Nicobar Islands. One which will be close to Port Blair will serve as in-situ conservation and can be used by researchers and tourist. Different kinds of ornaments will be carved out of the collected seed and sold to tourist who can take them as a memento from these Islands. Importance will be depleted on exhibit boards, Rudraksha plants that are multiplied will also be sold at no profit no loss basis. This will help in their conservation. If this garden is coupled with butterfly garden and bird nest tree garden will be a further attraction to tourist. In this paper all the *Elaeocarpus* species present in these Islands and present in same ecological habitat which can be introduced in to these Islands is discussed in this paper.

**Key words:** *Elaeocarpus*, conservation, tourist, habitat

### Introduction

In the world most of the people started worshipping nature. Many worship the sun as a god giving energy, moon giving fertility and cool mind, wind is the God of power the water/rivers as lifesaving element and many trees are the protectors of calamities, to supply energy in the form of food and nutrition. Tree worship is found in ancient societies the world over more in Indian and its subcontinent. The Indian gods are associated with one or the other tree/flower/seed/leaves etc. During Ganesh puja many leaves are pruned for better growth. Likewise the God Shiva worshiped with leaves of Beal which is associated with the Shiva temples.

In the world over tree worship was found in ancient literature and also in the ancient civilization. Harappan seals were found with many trees and flower likewise Egyptians worship *Tamarix anglica*, *Ficus sycamorous* and *Persea americana*. The Persian gave importance to *Asclepios acidde* or *Sarcostema viminalis*. The Greece gave important to oak tree (*Quercus robur*), Laurel tree (*Laurea nobilis*) and many more like *Vitis vinifera*, *Olive europae*, *Myrtus communis* and many more. Sarmatia civilization, Judea, Germania, Scandinavia, America and other civilizations also worshiped trees. All these people

worshipped the forest and groves and place trees among their gods.

In India also sacred groves or tree were associated with place of worship. These trees will also help in producing seeds and keep the biodiversity of the place in order.

The *Ficus religiosa* which is having many local names generally called as piple. This is a large tree with lot of birds and insects hibernate. It itself is a big gene pool of birds, ants and other insects i.e., butterfly, lizards, rodents etc. Generally this species is having co-existence with wasps which is a biological control agent for many insects. Generally a shiva temple is associated with this tree likewise tulasi, neem, bel are also worshiped time to time.

Rudraksha *Elaeocarpus sp.* is also associated with Shiva and all Hindus, wear it one form or other. In Indonesia all wear Rudraksha for health purpose Hindu, Muslim, Jain or Christians. There is a base number to wear which may be Tabbo.

*Elaeocarpus sphericus* (Gaertn) is the real Rudraksha is found in Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Manipur, Nagaland and in West

Bengal. It is also present in other Asian countries like Bangladesh, Malaysia, Myanmar and Nepal at variant altitudes. This also can be introduced in Andaman and Nicobar Islands.

There are three more genera *Monocera*, *Ganitrus* and *Curspedum* which have seven, two and one species which are also like *Elaeocarpus* are being used as scared beet.

## Materials and methods

The literature that is available in different journals and books has been thoroughly screened for *Elaeocarpu*speices. All the information available

is pooled to and the thought of having a garden of *Elaeocarpus* have been developed for tourist and conservation of this species. Economic exploitation of the species also discussed. The species that are available in these Islands have been given in Table – 1, the species that can be introduced are given in table – 2 along with important species present in India and in south-East Asia are given for creating interest and information. Selections of species that can be grown/introduced here have been selected on the basis of altitude and habitat ecology which is having close links with Andaman and Nicobar islands. Some of them may not flower and fruit in these Islands, however the species can be grown

**Table 1: Main biometric characters of *Elaeocarpus Sp.* present in Andaman and Nicobar Islands, India.**

S.No.	Species	Tree size	Flowering period	Fruiting period	Habitat*	Remarks
1	<i>E. aristatus</i> Roxb.	15-30M	April-Sept	June-Oct	ANMO	Rare in littoral and Inland forest coast of Dogmar river. (Great Nicobar)
2	<i>E. floribundus</i> Blume	15-25M	Mar-Aug	Oct-Dec	ANMO	
3	<i>E. helferi</i> Kurzex. most	15-20M	Apr-Jun	Aug-Oct	AN-O	
4	<i>E. macrocerus</i> (Turez) Merr	10-20M	Feb-Mar	May-Jun	AN-O	Rare in evergreen Inland forest along streams. (Great Nicobar)
5	<i>E. petiolatus</i> (Jack) Wall	20-30M	Dec-Mar	Jul-Sep	ANMO	Rare in Inland forests present at 36 Km on east-west road (Great Nicobar)
6	<i>E. rugosus</i>	25-35M	Feb-Apr	Jul-Oct	ANMO	
7	<i>E. tectorius</i>	15-30M	Mar-Jun	Jul-Oct	A-MO	
8	<i>E. tuberculatus</i> Roxb.	60-80M	Dec-Feb	May-Oct	A - MO	

\*A = Andaman; N= Nicobar; M= Mainland; O= Outside India

**Table 2: *Elaeocarpus* species present in Mainland, India and in the same habitat as Andaman and Nicobar Islands.**

S.No.	Species	Altitude (metres)	Habitat/location in A&N Islands
1	<i>Elaeocarpus amoenus</i> Thwaites*	1500-2000	Sri Lanka, central province upto 400m Tamil Nadu
2	<i>Elaeocarpus apiculatus</i> Mast**	500-800	Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Bangladesh, Malaysia, Myanmar
3	<i>Elaeocarpus aristatus</i> Roxb**	1500-2000	Andaman & Nicobar Islands, Arunachal Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Bangladesh, Bhutan, Myanmar
4	<i>Elaeocarpus balansae</i> A. DC. *	1100	India, Cambodia, China, Myanmar, Vietnam
5	<i>Elaeocarpus bracteatus</i> Kurz*	1000-1500	Arunachal Pradesh, Assam, Myanmar
6	<i>Elaeocarpus cuneatus</i> Wight	1500	Kerala, Malabar coast about Quilon, Sri Lanka
7	<i>Elaeocarpus dulbius</i> A. DC. *		Arunachal Pradesh

	<i>Elaeocarpus floridundus</i> Blume**	1000-1500	Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, West Bengal, Bangladesh, Bhutan, Indonesia, Malaysia, Myanmar
8	<i>Elaeocarpus gaussonii</i> Weibel*	1500	Tamil Nadu (Endemic)
9	<i>Elaeocarpus glandulosus</i> Wall*	1000-2000	Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu (Asia)
10	<i>Elaeocarpus grandifolius</i> *	1000-1500	Assam, Myanmar
11	<i>Elaeocarpus hygrophilus</i> Kurz*	800-1000	Assam, Myanmar
	<i>Elaeocarpus helferi</i> Kurz ex Most**		Andaman and Nicobar Islands
12	<i>Elaeocarpus integer</i> (C. Muell.)	800-1000	Assam, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam
13	<i>Elaeocarpus lacunosus</i> Wall ex Kurz	1500-2000	India, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam
14	<i>Elaeocarpus leptostachyus</i> Wall	1500-2000	Many states in India (coastal) and Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Manipur, Mizoram, Nagaland, Sikkim, Tripura, Bangladesh, China, Malaysia, Myanmar, Nepal, Sri Lanka.
15	<i>Elaeocarpus littoralis</i> Kurz	500-1000	Assam, China, Indonesia, Malaysia, Myanmar
16	<i>Elaeocarpus lucidus</i> Roxb.	1000-1200	Andhra Pradesh, Assam, Meghalaya, West Bengal, Bangladesh
17	<i>Elaeocarpus macrocerus</i> (Turez.) **		Andaman and Nicobar Islands
18	<i>Elaeocarpus monocera</i> Auct	1000-1500	Kerala, Tamil Nadu (Endemic)
19	<i>Elaeocarpus munroii</i> (Wight.)		Karnataka, coorg, India
20	<i>Elaeocarpus oblongus</i> Auct*	1500	Karnataka, Kerala, Maharashtra, Sikkim, Tamil Nadu, Bhutan, China, Indonesia (Java), Malaysia, Myanmar, Nepal, Sri Lanka
22	<i>Elaeocarpus obtusus</i> Auct	500-1000	Assam, China, Indonesia, Malaysia
23	<i>Elaeocarpus perim-kara</i> DC	1500	Kerala, Malabar
24	<i>Elaeocarpus petiolatus</i> (Jack) Wall. Ex. Steud. **		Andaman and Nicobar Islands
25	<i>Elaeocarpus resinusus</i> Blume	800-1000	Assam, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam
26	<i>Elaeocarpus robustus</i> Roxb.	1500-2000	All coastal states of India, Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Sri Lanka
	<i>Elaeocarpus rigidus</i>		Andaman and Nicobar Islands
27	<i>Elaeocarpus serratus</i> L	1500	Karnataka, Kerala, Maharashtra, Tamil Nadu, Bhutan, China, Indonesia (Java), Malaysia, Myanmar, Nepal, Sri Lanka
28	<i>Elaeocarpus stapfianus</i> Gagnep	800-1000	Arunachal Pradesh, Assam
29	<i>Elaeocarpus tectorius</i> Auct**		Andaman & Nicobar Islands
	<i>Elaeocarpus tuberculatus</i> Roxb**	1000-1500	Andaman & Nicobar Islands, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Malaysia
	<i>Elaeocarpus tectorious</i> **		Andaman & Nicobar Islands
30	<i>Elaeocarpus venustus</i> Bedd.	4500ft	Kerala, South Travancore
31	<i>Elaeocarpus wallichii</i> Kurz	800-1000	Assam, Orissa, Myanmar
32	<i>Elaeocarpus sphaeriucus</i> *Ψ		Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Manipur, Nagaland, West Bengal, Bangladesh, Malaysia, Myanmar, Nepal

\*To be introduced for Gardening

\*\*Present in A&N Islands

Ψ Real Rudraksha

## Botany

It belongs to order Oxalidales, family Elaeocarpaceae, genera *Elaeocarpus*. Elaeocarpaceae, has about 360 species distributed in temperate, sub-tropical and tropical zones throughout south east Asian, Australia, Chile, New Zealand and the West Indies. Out of about 120 species of *Elaeocarpus* reported from Asia, 25 species occur in India (Khan etc Root).

In Andaman and Nicobar Islands one genera and eight species are present. *Elaeocarpus* is a large to medium size tree of 15 to 30M long except *Elaeocarpus tuberculatus* which is a very tall tree grows up to 60M tall. Leaves are alternatively often crowded at ends of branchlets. The flowering period varies from species to species (April – September). It fruits in about 3 to 4 months after flowering and some species take more time.

In Indian mainland many species are present (Table 2). Rudraksha grows in the area from the gangetic plain in the foot hills of the Himalayas to South East Asia, Indonesia, New Guinea to Australia Guam and Hawaii.

Rudraksha is also used for treatment of various diseases in traditional Indian medicine. Rudraksha mala (108 in number) has been used by Hindus as well as Sikhs and Buddhists as rosary at least from the 10<sup>th</sup> century onwards for meditation purposes and to sanctify the minds.

The central hard Rudraksha seed may have 1 to 21 faces. In general there will be five faces (divisions) and these are considered to be worn with red string or a gold chain.

## Garden of Rudraksha for tourist attraction

With the support of social forestry of Department of Environment and Forest multiplies the available *Elaeocarpu* spp and distributes it. It is a good affords for conservation of the local species. Special efforts should be made to multiply *E. macrocerus* (Turez) Merr., *E. petiolatus* (Jack) Wall. Ex. Steud. And *E. Aristatus* Roxb. which are present in Great Nicobar Islands which are rare in the forest.

There are 51 species of *Elaeocarpus*, seven species of *Macrocerus*, two of *Ganitrus* and one of *craspendum*. Out of these 21 can be grown in an altitude of 1000-15000 Mt, 10 species in 1500-2000mt, four species above 2000 to 2500mt. There are 14 species which can grow below 1000 Mt altitude. There are eight species in Andaman and Nicobar Islands, one in Kerala, Karnataka, Maharashtra and Tamil Nadu and eight species in Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Tripura. Few species of *Elaeocarpu* species can be selected for growing in Andaman and Nicobar Islands for tourist interest.

Rudraksh farming is a difficult process due to the slow sprouting from the seeds. Depending on the humidity of the soil, it usually takes 1-2 years for a seed to sprout. It can be grown successfully in tropical and sub-tropical conditions with temperature ranges of 25-30°C. Andaman and Nicobar Islands are ideally suitable for its growth as it has ideal humidity and temperature requirements for its growth. The tree starts giving fruits after 4-7 years and fruits for long time.

A Rudraksh can be introduced in these Islands as *Elaeocarpus sp.* is already present in the wild. As its germination is poor and takes a lot of time so its spreading and overpowering the local species does not arise.

The seeds show variation in the number of grooves on their surface, and are classified on the basis of the number of divisions (Mukas) that they have. Different qualities are attributed to the Rudraksha based on the number of grooves or Mukhs (faces).

That it has a common type with five divisions and there are considered to be symbolic of the five face of Shiva. The same tree depending on the agro-climate produces seeds with different number of Mukhus (division).

Rudraksha are considered auspicious as well as powerful and are supposed to have interesting astrological benefits according to modern astrologers.

As said in Andaman and Nicobar Islands there are eight species of *Elaeocarpus*. If we can grow all these and also important species from North East and Western

Ghats it will become a Rudraksh germplasm pool and a garden for visiting by incoming tourist.

Most important species of *Elaeocarpus ganitus* (Roxb.) should also be introduced which is true Rudraksha.

In Great Nicobar Islands there are three species i.e., *E. macrocerus*, *E. Petiolatus* and *E. aristatus*. However in the Nicobar groups six species are present. All these species rare in distribution and requires conservation. Among these *E. macrocerus* produces seeds which are more or less similar to that of true Rudraksha (*E. sphericus*). According to Pandey and Diwikar (2008) reported all the eight species are present in Andaman Islands, six species in Nicobar group of Islands. Two of them are not present on mainland India. Two species *E. macrocerus* and *E. petiolatus* are rare in evergreen inland forests. The former are is present along the streams and the rare are at 36 Km on east-west road in Great Nicobar Island. However Sinha et al. (1999) reported only three species from Great Nicobar Island. The seeds of *E. Petiolatus* are the smallest and more suitable for mala for meditation and sold at high price. The wood is of poor quality.

In nature, the germination of most of the *Elaeocarpus* sp. nuts is very low and erratic, since nuts are unable to imbibe water (Bhuyan et al., 2002). Poor or no germination coupled with prolonged dormancy owing to the hardness of the endocarp causes significant reduction in the generation of several *Elaeocarpus* species (Khan et al, 2003). Therefore Horticulture technologies should be used to encourage germination/ multiplication of these genera.

Propagation from seed can be enhanced by stratification of seed with 1% H<sub>2</sub>SO<sub>4</sub>, mechanical scarification or dried in sunlight for five days will break the dormancy. This can also be done by vegetative propagation by stem cuttings of small shoot portions of pencil thickness with meristems can be used by treating with IBA (1200ppm) and NAA (400ppm) for two hours will increase sporulation and formulation of new shoots. There after treatment have to be planted on raised beds on forest soil.

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Treatment of seeds with 1% H<sub>2</sub>SO<sub>4</sub> for three hours, mechanical scarification, dried in sunlight for five day to break the dormancy were tried.

Dispersal and predation of *Elaeocarpus* species was not carried out in the forest of Andaman and Nicobar Islands. Urgent need is there to study the fruit set in each species have to be carried out along with primary seed dispersal and secondary seed dispersal along with other biological studies like pollen viability etc. It is also urgent need to find out the habitat and plant population of these species in these Islands.

The trees can be grown at a distance of 10 to 15 metres and in the inter place some herbs can be grown which are endemic to Andaman and Nicobar Islands and labelled for tourist information with proper trimming and pruning these species can also be tried as avenue plantation.

Nut collection for religions jewellery in the form of beads educes the volume of soil seed ban, which has adversely affected natural regeneration of the species.

Several factors, including trees, size, light and climatic condition and known to affect initiation, frequency intensity and duration of flowering and fruiting in tropical tree species and true in this genus also.

## Uses

Most of the *Elaeocarpus* family members have indolizidine alkaloid compounds, which have attracted a great deal of interest on account of their ability to inhibit the enzymatic activity of glycosidase. Hence there is some potential to explore it further in the treatment of AIDS, Diabetes and Cancer (Wiar, 2006).

In Great Nicobar Island the Shompen tribes bring small seeds of *Elaeocarpus* from forest and batter with shop keepers for tea, tobacco etc. which are the costliest in these Islands, which are converted in to ornaments.

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