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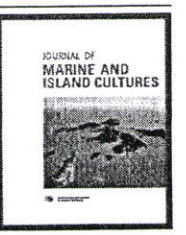

Traditional usages of ichthyotoxic plant *Barringtonia asiatica* (L.) Kurz. by the Nicobari tribes

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Abstract The *Barringtonia asiatica* is a medium size tree commonly found in Car Nicobar Island known for its ichthyotoxic property. It grows on sandy and rocky shore areas and has lantern shaped seeds, locally called *Kinyav* used during the calm season in shallow and low tide waters for killing fishes, octopus, etc. At every successful operation they harvest about 1–3 kg and on the whole about 10–20 kg of fishes per trip. This method of fish catching was popular among the Car Nicobari tribes until massive tsunami of 26th December, 2004, which caused dislocation of tribes from their erstwhile coastal inhabitations to interior areas, damage of coral reefs, permanent water intrusion in the inter-tidal area and destruction of *Kinyav* trees. Hence, now-a-days the popularity of this fishing method among them has diminished. The study not only reveals the usefulness of seeds in harvesting of fishes but also the utilization of other parts of tree such as leaves for therapeutic purpose in fracture, wound, de-worming, pain relieving of human beings; log for construction of canoe, wooden houses, sitting stage, handicraft items, fire wood and whole tree for preventing the coastal erosion.

Introduction

Andaman Nicobar Islands (ANI) is a union territory of Republic India, located in the Bay of Bengal, blessed with enchanting beauty of white sandy beaches, blue colour sea and biologically rich flora and fauna. The capital of ANI is Port Blair situated about 1200 km from mainland. This archipelago with an area of 8249 sq.km is divided into three districts namely South Andaman, North & Middle Andaman and Nicobar. The native people of these Islands belong to two races viz., Onges, Jarwas, Sentinels, and Great Andamanese,

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who are of Negroids and are restricted within the Andaman Islands and Nicobarese and Shompens, who are of Mongoloid race and mostly restricted with in Nicobar group of Islands (Singh et al., 2012). Among all native tribes of ANI, the population of Nicobarese have grown over time. A significant proportion of their population lives in Car Nicobar Island which is the Capital of Nicobar district. Their socio-economic status and livelihood highly depend on coconut farming (Salam et al., 2010), Piggery and marine fisheries. They harvest the fishery resources for their sustenance by employing indigenous techniques and modern fishing gears like spear, harpoon, hook and line, gillnet, cast net, troll line, shore seine, light fishing and plant poison (Zamir Ahmed et al., 2013). Fish poisoning was mainly considered as women fishing method, irrespective of adult genders employed in this type of fishing during the low tides. The tree *Barringtonia asiatica* is used as fish poison in various countries from Madagascar to Tahiti, including the Nicobar Islands of India, Celebes, Philippines, the Marianas, New Britain, Solomon Islands, Queensland, Fiji, Samoa, and most of Polynesia which includes Tahiti and the Marquesas (Quigley, 1956). Shompens of Great Nicobar Island utilize the seed for poisoning the fishes and trunk of the tree for making canoe (Elanchezhilan et al., 2007) while the Onges of consumes its seeds after toasting (Bhargava, 1983).

Among all the fishing methods practiced by the Nicobarese tribes, fish poisoning or stupefying by *B. asiatica* seeds locally called as *Kinyav* deserves special mention. Since the tree not only plays a vital role in harvesting of small to medium size fishes but also for various other purposes like healing diseases, making of canoe constructing of sitting stage, house, fire wood and handicrafts. The 2004 *Tsunami* hit Car Nicobar Island very hard and damaged 70% of the coral reef area (Saxena et al., 2008) which in turn destructed the fishing ground and lead to water intrusion in the intertidal areas. The trees were also damaged and washed away. Due to the devastation of coastal fishing ground, reduction in number of trees, unavailability of the seeds and introduction of modern fishing gears, the popularity of traditional practices like fish poisoning is fading in Car Nicobar. Even though there are many uses from this tree, very limited information is available on them and this paper aims to document the details of the traditional practices of the Nicobarese and the scope of reviving their usage among them.

Methodology

The Nicobarese are spread into 13 out of total 28 Nicobar groups of Islands (Anon, 2006). The Car Nicobar Island which lies between 9° 00′ and 9° 20′N latitude and 92° 30′ and 92° 50′E longitude (Verma et al., 2010) and spread over an area of 126.9 sq.km. The study was conducted from February, 2013 to June, 2013 at Car Nicobar Islands on the traditional use of *Kinyav* (*B. asiatica*) tree in harvesting of fishes, treating of human ailments and others. For the study a total of 50 fishermen including fisherwomen and local doctors were selected from 6 villages namely, Kakana, Malacca, Perka, Big Lapathy, Kinmai and Arong. The information were collected through participatory research tool such as personal interview, group discussion and personal observation also from secondary data's.

Result and discussion

The *B. asiatica* is a medium sized tree found around sandy and rocky shores of Car Nicobar. It has long leaf (Fig. 1a), beautiful flower and box or lantern shaped fruit (Fig. 1b) which is extremely water resistant and buoyant. The flowers of this tree are white with pinkish edge and the fruits can be found in the intertidal area of sandy and rocky beaches (Fig. 1c). It is very common that one can find the newly germinated seed along the shore side (Fig. 1d). Fishing using these seeds is mainly carried out in the dry and calm season of March to May months.

Seed collection

Even though all the parts of the tree are poisonous, seeds are only used for killing the fishes in this Island. The ichthyotoxic property of the seeds is attributed to Saponin in the *Barringtonia* seeds (Barrau, 1955). Both mature (ripened) and immature (green) fruits are collected for this purpose (Fig. 1e). In case of mature fruits, it is collected from underneath the tree or in the beach areas since, it drops off once the outermost layer turns from green to brown and the immature fruits are plucked directly from the tree. Usually a day before fishing, the Nicobarese collect the fruit and store it in a jute sack (Fig. 1f). Since it is poisonous, in order to avoid accidental consumption of these fruits by children or livestock, the tribes do not store the collected fruits at their dwelling places.

Grating

The collected matured and immature fruits are cut (Fig. 1g), outer layers stripped off (Fig. 1h) and the seeds (Fig. 1i) are separated. Later it is grated on the same day at the fishing site or a day before venturing into sea. The plant branch with thorny stump locally called *kunial* (Fig. 1j) is used for grating. The thorny stump of 1m height is kept vertically by resting one end at the ground the seeds were firmly moved up and down against the stump to get pulp.

Site selection

The success of this method depends on the selection of correct site and time (Fig. 1k). The lowest low tides and preferably full moon day time is selected for this type of fishing. The spring tide of the new moon fills the pools and inundated places with sea water in the intertidal area (Fig. 1l), where the water gets stagnated along with fish for longer duration and is exposed during low tide. For selecting the suitable area, skilled tribal fishers visit the intertidal area and check the presence of fish and depth of the stagnated waters by naked eye. Usually knee depth water is selected for this purpose. Even though this Island does not have any natural spring, due to heavy rain pour, seasonal streams, fresh water stagnation around the Island lodge small fishes, eel and freshwater prawns, which are harvested seasonally using the ichthyotoxic seeds.

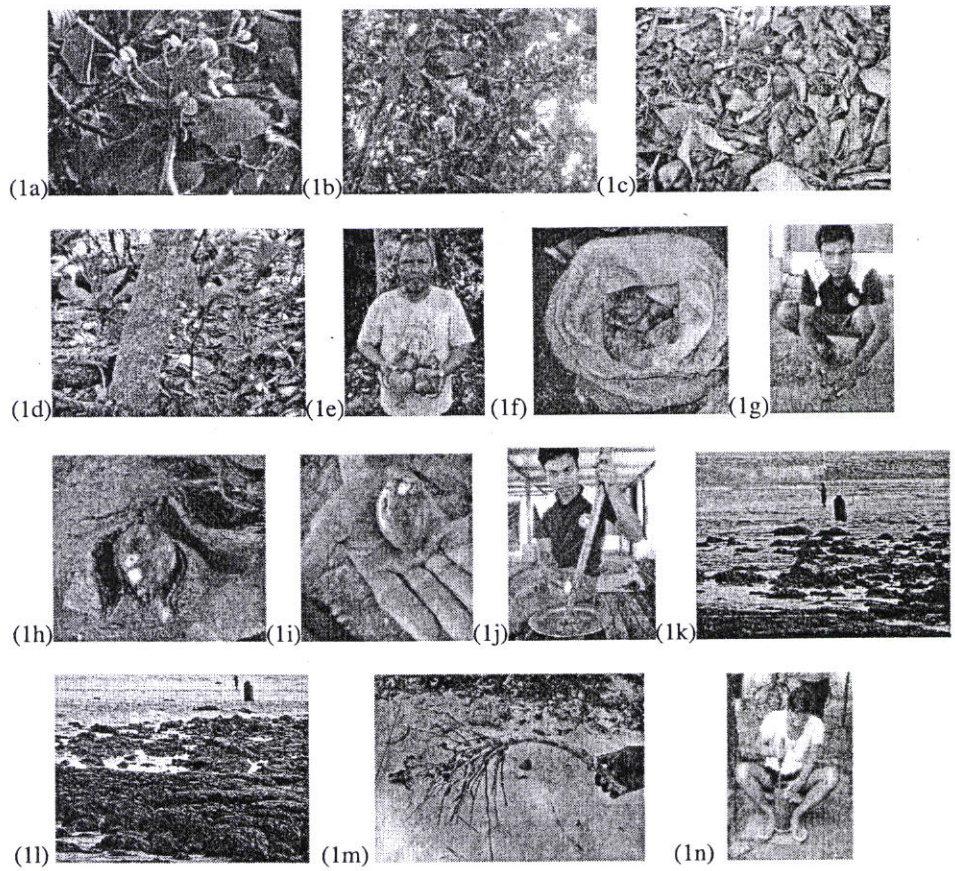


Fig. 1 (1a) Kinyav leaves with blossom, (1b) Kinyav fruit, (1c) Kinyav dried fruits, (1d) Germination of seeds, (1e) collection of fruit, (1f) Storing of fruits, (1g) Cutting of the dried fruit, (1h) Removing of fibrous layer, (1i) Kinyav seed, (1j) Grating of seed, (1k) Preparation of herbal medicine (1l) Fishermen selecting location, (1m) Intertidal area during low tide, (1n) Preparation of Ayurveda medicine.

Application

The fishes which gain entry into small inlets of coastal areas are confined by placing coconut branches or dead coral stone across the entry (Silas, 1985). Evenly grated seeds are applied uniformly over the selected area by broadcasting where plenty of fishes are available. At a time about 1–1.5 kg of seed scrapings were sprinkled over the area where the small fishes about < 50 g get narcotised. The pulp is mixed along with ash before spraying over water to cover more area and uniform application of pulps, and additionally, it renders the water turbid and adds to the stress of the fish.

The pulp releases poison slowly while sinking in the water on which the fish stuns, and floats on the water surface in few minutes. Sometimes they demarcate the area of poisoning with branches of tree or wood for easy identification.

Sometimes, pulps are filled in jute sack and dipped or dragged on the water column to aid their release. The pulp is also at times, filled in the stomach of small fishes to catch big fishes. Later the tribal women along with their companion, hand pick the floating fishes or beat the jumping fishes using coconut inflorescence stalk (Fig. 1m). The activity of the seeds is known to last for about 30 min and on each such effort 1–3 kg of fish are collected.

Fish attracting techniques

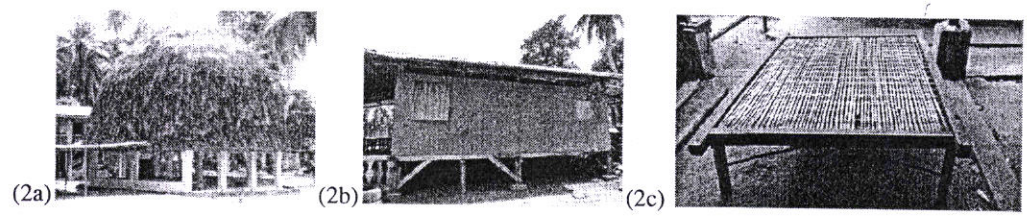
The Nicobarese sometime uses the branches of plants, rice beer (*Andiya*), made by fermentation of rice and dough made of wheat flour sprayed over water to attract and aggregate big and small fishes in a particular place. This technique is mostly employed in freshwater resources.

Preparation and consumption of killed fishes

Despite the fact that the fish is killed by narcotisation, no human beings get affected by consuming the narcotized fish (Stokes, 1921). The narcotized fishes were washed thoroughly after removing the gut and gill and then prepared as *Unyav* or fry or gravy. *Unyav* is delicious and consumed in a raw state. It is made by cutting of fishes into small pieces then mixed along with salt, coconut milk and juice of lemon and allowed for about 5 min to make the fish softer.

Fishing gears used for harvesting narcotized fishes

Immediate after application of the ichthyotoxic fruit the fishes start to float on the water area. They are harvested through



(2a) (2b) (2c)

Fig. 2 (2a) Nicobari traditional hut, (2b) Nicobari rectangular House, (2c) Nicobari Machan.

handpicking or employing mosquito net and gill net by encircling. The coconut inflorescence stalk is also employed for catching of active fishes through hard hitting.

Fisheries management practices

The Car Nicobari tribes follow traditional management practice for sustainable resource utilization. In some villages, the village council imposes ban for one year on the areas where *Kinyav* is applied for fishing so as to allow the fish to gather in the those areas and have devised penalties for the violators will be made to.

Taboos related to *Kinyav* fishing

The Nicobari tribes of Nicobar district have various socio-religious beliefs, taboos and superstitious beliefs. *Kinyav* fishing is integral to the custom of the Car Nicobar tribes. During the first pregnancy of a tribal woman, the *tuhet* (group of family members) takes her to the sea shore and provide a grand feast. During this occasion, the members of family use *Kinyav* as one of the fishing tool for harvesting the fishes from sea. Various delicacies are prepared from the fishes harvested at the shore side. The woman would abstain from consuming fish from then until her child reaches about 6 months old or starts to walk.

Medicinal and other uses

The Nicobari tribes are employing various medicinal plants and trees present in their dwelling site, jungle from very long time, for fulfilling their needs and keep themselves alive. The local traditional practitioners were utilizing various parts of plant such as leaves, bark, roots, fruits and coconut oil etc. for preparing the medicines (Fig. 1n) and to treat various ailments like cough, fever, headache, body pains, wounds, arthritis, skin disease, hair loss, jaundice etc. *Kinyav* tree also no exception in it, apart from its seeds, the leaves and its logs were also commonly used by them for various purposes. The leaves of *Kinyav* tree are squeezed and juice applied over wounds or injuries as a pain reliever. The juice is also used for de-worming the human beings. About 3 *Kinyav* leaves are ground and added along with coconut oil. It is heated and the extract decanted to remove the fibres of leaves. The dosage and medication time varies with the age of the patient.

As reported by Gupta et al. (2004) the *Kinyav* leaves were also found used for curing fracture and wounds, where the leaves of *Kinyav*, *Ipomea pes-caprae* (L.), *Euphorbia hirta* L. squeezed along with sweet are mixed with coconut oil and applied outwardly on the fracture and in case of wounds the leaves were heated and made into paste applied.

The Nicobarese use the stem pieces of *Kinyav* tree for making the floor of their traditional hut (Chauhan et al., 2004). Nicobarese traditional hut is a semi-circular (Fig. 2a) or rectangular house (Fig. 2b) which is raised above ground level by 2–4 m, to reach which, a stepladder is used (Shariff, 2008). *Kinyav* wood is also used for making rack for drying coconut and as a fire wood while making copra but not for domestic purposes owing to the fear of toxic compound in the wood. They use the wood to make small sitting stage, frames and legs of cot (*Machan*) (Fig. 2c).

Even though *Kinyav* fruit is a non-selective ichthyotoxicant, the major marine fishes caught by this method include *Michala*, *Tumlehcha*, *Kieva*, *Karut*, *Tirot*, *Tumrech*, *Thunuva*, *Lainy*, *Chafa*, *Chufoka*, and the fresh water fishes such as *Tilam Kak*, *Kak Thavunch*, *Thachuvera* and *Inyany*.

Experiment conducted by Dam Roy (1996) by using raw *B. asiatica* fruit on adult predatory fishes showed that it is effective in killing such predators as *Elops machnata*, *Therapon jarbua* and *Megalops cyprinoides*. The LT_{100} ranges within a period is 85–145 minutes, which is quite encouraging because sometimes these fishes become menace when they enter as intruder in any other culture experiments where culture of mullets/prawn etc. are undertaken.

Conclusion

The Car Nicobar Island has diverse flora and fauna which is integral to the socio-cultural setting of the tribal fishers over centuries. Historically, fishing by means of poisoning is very familiar all over the world (Heizer, 1953). In several countries various parts of different coastal vegetation such as leaves, seed or bark are used to stun fish, apart from aiding in protecting the coastal areas (Pauku, 2006). *Kinyav* has been traditionally in use among the Car Nicobar tribes for making houses and canoes, healing human beings and also for stupefying the coastal fishes.

Due to the exposure of these tribes with the outside world, modern amenities, education, the mind-set, awareness, lack of time, they are not only gradually forgetting their culture, traditional beliefs, taboos and also the indigenous knowledge learned over many decades. Besides all these factors the age old traditional people who fully depend on the indigenous practices are putting their efforts in teaching the younger generation but due to lack of interest among the youngsters, precious traditional knowledge face the threat of getting vanished. The traditional uses and practices with *Kinyav* tree deserve

special attention owing to their utility in multifarious purposes. They also have the potential to reduce the impact of natural disasters on the islands. The study highlights the traditional uses of *Kinyav* and the need for reviving the socio-cultural values and practices in connection with *Kinyav*.

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