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## RESEARCH ARTICLE

### TRADITIONAL PRACTICES FOR COMMON HEALTH DISEASE TREATMENT WITH HERBAL PLANT (*MORINDACITRIFOLIA*) BY TRIBAL: AN EXPLORATORY STUDY OF BAY ISLANDS, INDIA

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#### ABSTRACT

The use of herbs for various health alignments treatment is age old practice in India particularly among the tribal community. However, various herbs are time tested at the farmer's level for sustainability through a dynamic process of socio economic development over the year. Hence, the utilization of different plants need to be scientifically tested and analyzed for advocating for mass adoption. *Morindacitrifolia* is one of the plant used for many health alignments treatment in Andaman and Nicobar Islands, India. However, traditional medicinal knowledge can be source of economic opportunities and may help in providing enormous jobs. This study reports the traditional knowledge on medicinal plant practiced by the Nicobaries for healing of several health alignments using different part of Noni. This study was conducted in tribal dominant areas of A & N Islands where in tribal follows joint family system. For common health disorders, these people seek the treatment from local herbal practitioners. However, fast developing world is attracting younger generation towards allopathic treatment but still about 48 percent tribal of Nicobar use Noni for treatment of various health disorders. We have collected information from the local practitioners and old people of tribal community who use *morindacitrifolia* for several purposes. Their experiences and perceptions were recorded and presented in this paper. The study recommends that local wisdom needs be protected by people and government efforts.

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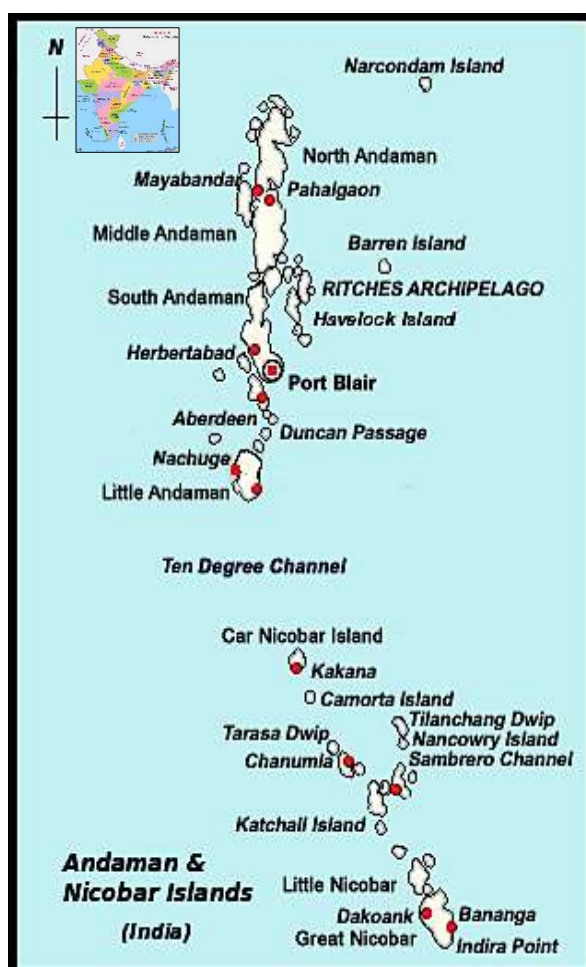
## INTRODUCTION

The use of medicinal plants for the treatment and cure of disease shows that traditional medicinal practices have been associated with humanity since times immemorial (Halberstein, 2005). The local communities have discovered the medicinal uses of thousands of plants found in India (Bhattarai et al., 2010). Studies indicate that >6400 flowering plants have ethno medicinal value while 10% are used by drug and pharmaceutical industries in India (Verma et al., 2007). Ethnobotany of the medicinal plants used by the tribes of Andaman and Nicobar are not fully studied (Gupta et al., 2010, 2013). Though the tsunami, 2004 devastated the life of tribal, still they maintain their traditional cultural and social rituals in their daily life (Manimunda et al., 2012, Chand et al., 2015). The conversion of socio-cultural traditions and indigenous knowledge into livelihood means and economic opportunities. The studies revealed that for the sake of survival, people use their old age indigenous knowledge (GibjiNimacho, 2008, Sethietal., 2011).

It is believed that one of the most valued medicinal plant *morindacitrifolia* might have been originated here. The Noni, *Morindacitrifolia* Linn., known as Indian Mulberry and one of the important medicinal plant of Rubiaceae family found in these islands. Locally known as *Lorang*, *Burmaphal*, *Pongeephal* and *Suraogi* by the tribal of Andaman and Nicobar Islands (Singh et al., 2005; 2009). However, modernization has compelled the society to depend on mostly on English medicines and least importance is given to traditional plants and herbs. Therefore, in this paper we explain the use of *Morindacitrifolia* and how it is widely used by tribal? What are the perceptions of Noni user? Why tribal still believe effectiveness of Noni for treatment of many health disorders? The present study reviews the research efforts in India and abroad. These studies further explain the tribal wisdom of using noni for different health alignments to understand the frequency of use this plant in their routine health care. The findings of the study will add the information for policy formation and for researcher for the betterment of tribal of these islands.

## MATERIAL AND METHODS

**Geographic profile of study area:** The topography of the A&N islands is rolling with low range hilly mountains to narrow valley at the foothills. The A&N groups of Islands lie in the Bay of Bengal (6-14° N lat.; 92-94° E long.). The climate of the Islands is equatorial warm humid tropical. Average temperature varies from 29 to 32°C (maximum) and 22 to 24°C (minimum), respectively. Average annual rainfall is 3100 mm, distributed over 8-9 months. Average Relative Humidity (RH) in A&N islands ranges from 68 to 86 per cent (Fig. 1 location map of study area). A & N islands comprise of 572 islands, islets and rocks having geographical area of 8249 sq.km of which 7171 sq.km. Forest area includes about 40.7 percent dense forest, 32.8 percent moderately dense and 7.56 per cent open forest (FSI, 2010). The islands have extensive coastline and inland creeks, which are fringed with coastal forests and mangroves. There are about 5300 species of faunal biodiversity and 9 percent are endemic (Khatri, 1993, Rao, 1996; Government of India, 1997, 2000, 2001).



***Morindacitrifolia* plant habitat and locations:** Farmers use many medicinal plants with known medicinal properties across the different country. (Chinsemu et al., 2014; Verma, 2014; Luseba&Tshisikhawe, 2015). It can be grown in challenged environments viz, saline, acidic and alkaline soils. *M. citrifolia* has been known for its wide range of medicinal properties (Younos et al., 1990; Bruggnecate, 1992; Hiramatsu et al., 1993; Hirazumi et al., 1996; Solomon, 1999; Brown, 2012; Assi et al., 2015). Various reports are available for use of this plant for treatment of illness such as diabetes, blood pressure,

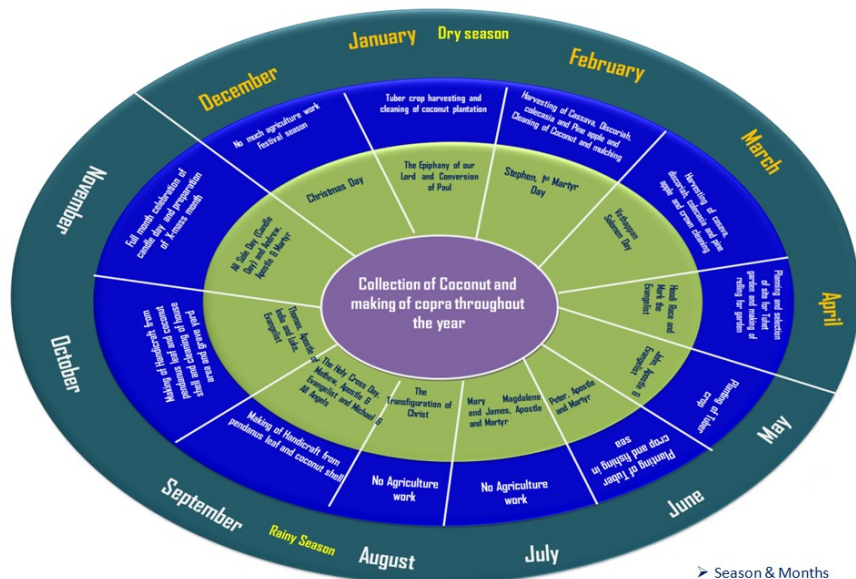
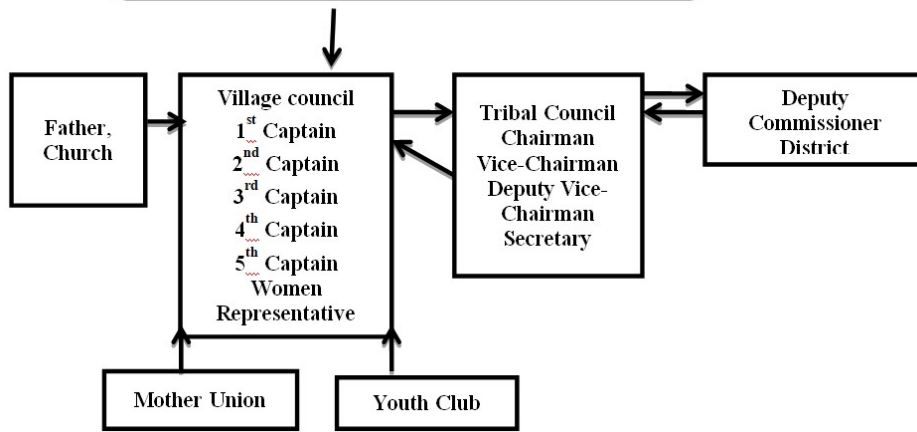
cancers, arthritis, poor digestion etc. (Singh et al., 1984; Whistler, 1992; Wang et al., 2002; Lee et al., 2012; Fletcher et al., 2013; Saminathan et al., 2013a; 2014b; Sharma et al., 2016, Aregheore, EM.; 2005, Arpornsuwan T., 2006). For unique medicinal value and other properties, the tribal of Andaman and Nicobar Islands used to eat this fruit with salt, but due to the unpleasant smell that emanates from the ripened fruit. A company Indian Noni Research Foundation (INRF), Chennai, India, sells the fruit juice in India. Noni is widely found throughout the coastal region and found growing wild along the fences and the roadsides due to its wide adaptability to hardy climatic conditions. The Nicobari tribes are using Noni for many healing and health management purposes and it provide the scenic beauty to local household habitation (Chand, 2018). Therefore, this paper highlights the use of Noni as medicinal plant by tribal of these Islands in India. The trade name is NONI, local name Lorang/ Burmaphal, scientific name *Morindacitrifolia* belong to Rubiaceae family and economic importance leaves, Bark, Fruit, Root, Flower and seeds. Widely adapted to the tropics, 1-800m (0-2600 ft.) depending on latitude, mean annual temperature of 20-35°C, annual rainfall of 250-4000 mm. historically, it was known as the “queen” of all canoe plants. In Southeast Asia, it is known as *Nhau*. In the islands of the South Pacific (Samoa and Tonga), the plant is known as *Nonu*. Having so much importance, this medicinal plant has not been given attention to explore its economic value and viability for commercial cultivation in coastal regions. In recent past some pharmaceutical industries and entrepreneurs have attracted towards noni cultivation to harvest opportunities for pharmaceutical and cosmetic industries.

**Demographics:** The A&N islands is having about 0.38 million populations (Census; 2011) of which around 82 per cent are literate. The Union Territory (UT) of Andaman and Nicobar Islands is divided into three districts namely South Andaman, North & Middle Andaman and Nicobar. At present, the population of A & N islands is composed of settlers from mainland India. In the recent years, the immigration has increased due to subsidized ship fares, foods and opportunities for jobs in the islands (Ambast et al. 2011). The table 1 depicts the number of households, tribal population in different districts, workforce and agriculture workers compiled from the statistical abstracts 2017-18, A & N Administration. The tribal population dominated in Car Nicobar Islands followed by South Andaman district. South, North and Middle Andaman were consisting of major population of non-tribal population whereas car Nicobar group of islands comprising of mostly tribal population. Apart from local tribal population, people migrate from main land as tourists, labourer for the want of work/job, staffs posted by the government departments and business people. Car Nicobar is a small island 127 sq.km in area situated 229 km South of Port Blair. Among them, 17,125 live in Car Nicobar Island, and the remaining in the Chowra, Teresa, Kamorta, Nancowry, Katchal, Little Nicobar and Great Nicobar Islands of Nicobar district.

**Tribes of A & N islands:** The tribal indigenous to the islands include the *Jarawas*, the *Sentinelese*, the *Great Andamanese*, and the *Onges*, who reside in the interior forests of Sentinel Islands, Strait Islands and Little Andaman. As on 2011, out of total Andaman and Nicobar population of 3.84 lakh, there were 300 *Jarawas*, 90 *Sentinelese*, 117 persons in *Onges*, 48 *Great Andamanese* and over 280 *Shompens* who constitute the primitive tribe (Statistical Abstract, 2016, Fig. 2:



Fig. 3: Tribal community management system  
Village Structure



- Season & Months
- Crop calendar
- Functions & festivals
- Round the year activity

Fig. 4. Tribal functions and festival activities

Different tribe of A & N Islands). The Nicobaries are belong to Mongoloid race and are believed to have originated in the mid Paleolithic era nearly 30000 to 60000 years ago. They speak different Nicobari language and medium of communication to researchers or outsiders is English or Hindi. These tribes have been using different medicinal plants for treatment of various health disorders traditionally.

**Data source and data Analysis:** Both a mixture of qualitative and quantitative methods were used in this study to analyze interpretation of the data. Although the approach is mostly inductive, interpretive and explanatory in nature, which are key characteristics of qualitative studies. An exploratory study was conducted in A & N Islands during 2013-14 particularly in tribal dominant areas. We have conducted the survey in those areas where noni plants were existing and they were identified by the local tribal key informants. Tribal people were asked the importance of noni in their day-to-day life. The structured questionnaire was used to collect the data from 173 key Informants. The Focus Group Discussions (FGDs) were also used to get unbiased, clear and holistic information of diverse cultural beliefs about herbs uses in the study area. The selection of Informants was based on their recognition as experts and knowledgeable members concerning folk medicine and local general knowledge. We put straight open-ended questions to the key informants like whether they use Noni in the healing suggested for which health disorders. We also asked the modes of preparation of remedies and how the medicines are administered. According to them, their knowledge of folk medicine was acquired mainly through parental heritage, or because they have experience about medicinal value of Noni to heal their kin or themselves. We use the information collected on Noni from the tribal user for health healing purpose and classified as High effect rated >0.7, medium effect 0.5 to 0.7 and low effect below 0.5. For this purpose, we used the scaling technique and scale was 0-1. We have also collected the information on family composition, way of living, social administration and community management system. Apart from this we have collected the data on round the year tribal socio economic activities, functions and rituals and engagements. Accordingly, analysis was carried out and the findings were reported as the perception of Noni users.

## RESULTS AND DISCUSSION

**Who harvest the benefits of *Morindacitrifolia*:** Nicobari families are patriarchal and as a rule live jointly and family known as *Tuhet*. The villages are administered as given in (Fig. 3). There is no individual ownership, but the *Tuhet* owns land, coconut and pigs and other assets. The *Tuhet* (clan) and family property are not transferable at the time of the marriage. The bride or the groom who join the *Tuhet* automatically gains these rights and has to be shifted to either side called *Gulam*. The survey observed that the love marriage is very common in Nicobari tribe and the age of marriage is quite high and meeting the legal criteria of >18 years for female and >21 years of male (Chand, 2009). Coconut, Pandanus pulp, fish, rice, medicinal plants, tuber crops or local vegetables constitutes their daily food. Pig and poultry are their occasional feast foods while now a day's vegetables are gaining popularity as part of tribal diet. The efforts of government have resulted to the fact that every family owns ration card for getting rice, wheat, sugar and kerosene oil through Fair Price Shops (FPS) which are available in all the islands. The study

observed that Nicobarese are very fond of stimulants such as tobacco and pan. In most of the Islands, each village are near seashore and consisting of public buildings, a meeting house, a lying in house, a mortuary and the cemetery. Post tsunami 2004, government has constructed group houses with the lightweight materials. However, tribal organize functions round the year.

**Round the year agriculture and activities performed by Nicobary tribe:** Tribal of these islands particularly Nicobari are music and sports lover. They celebrate festivals regularly along with farming activities as given in figure 4. The agriculture all activities are regularly performed during dry season. However, some of the work performed during rainy season also. The tribal had one and another festival every month. They use noni for treatment of several health alignments and other purposes and noni has been part of their home gardens since ages and been used as fruit, vegetable and medicine. Therefore, we have taken this important plant for our study. Source: Author has drawn *Event Calendar* based on data from tribal during survey 2013-14

**Nutrients availability in Noni plant:** It has been investigated by many researchers and reported that anticancer, antibacterial, and antimicrobial therapies, and in the treatment of esophageal reflux and ulcers in animals. Sattar *et al.*, 2012 and Siddiqui *et al.* 2014 demonstrated the effective benefits of a topical ointment prepared from noni stem extract against cutaneous leishmaniasis. Palu *et al.*, 2008 showed a 25% reduction in lipid peroxidation in the blood of athletes, after an endurance test, taking noni juice (NJ) compared to controls. The antioxidant properties of noni juice were also demonstrated by Wang *et al.*, 2012 involving 132 heavy cigarette smokers and reported reduced plasma levels of superoxide anion radicals and lipid hydroperoxide, which are considered biomarkers of degenerative diseases associated with cigarette smoking. Moreover, nutritional and chemical analyses have demonstrated that noni fruit contains 90% water and 10% dry matter and dry matter is consisting of soluble solids, dietary fibers, and proteins., 5% of soluble solids are reducing sugars (glucose and fructose) and 1.3% is sucrose (Chunhieng *et al.*, 2003). Approximately 11.3% of the dry matter is protein and the main amino acids are glutamic acid, aspartic acid, and isoleucine. Moreover, 10–12% are minerals, which include calcium, sulfur, potassium, magnesium, sodium, phosphorus, and traces of selenium. The main vitamins reported in noni fruit puree are ascorbic acid (vitamin C), which corresponds to 250 mg ascorbic acid per 100 g fresh matter, niacin (vitamin B3), and vitamin A. Several studies have reported human and animal toxicity. Comparison of nutrients in leaves (*Morindacitrifolia*) irrigated with normal water and seawater revealed that the Calcium content was invariably higher (5462 ppm) in leaves of normal water.

**Frequency of *Morinda (noni)* used for different healing purposes and reasons:** The respondents were classified in four groups based on the educational status (Table 3). Since, it was assumed that higher education may leads to good health management. The study revealed that 29 percent respondents were illiterate and they were mostly above 50 years of age. The educated people were at primary level 34 percent, followed by 23 percent, at higher secondary and 14 percent, above higher secondary level, respectively. Further table 3 indicates that 27.25 percent people frequently take noni for one and another disease curing purpose.



Fig. 5. Use of Noni by tribal for different purposes

Table 1: Socio economic features of A &amp; N islands (No.)

District particulars	Total Population	Scheduled Tribes Persons	Literates Persons	Total Worker Persons	Main Agricultural Labourer	Marginal Cultivator
Ferrargunj	53565(13.73)	489(6.23)	41883(13.64)	20558(12.97)	795(16.36)	279(9.15)
Bambooflat (CT)	7962(2.04)	69(0.88)	6262(2.04)	2952(1.86)	9(0.19)	7(0.23)
Prothrapur	57696(14.78)	628(8.01)	46573(15.16)	24986(15.77)	709(14.59)	675(22.15)
Little Andaman	18823(4.82)	1498(19.09)	13916(4.53)	7281(4.59)	116(2.39)	62(2.03)
Harmender Bay	1264(0.32)	1258(16.04)	859(0.28)	605(0.38)	0	2(0.07)
<b>1. South Andaman</b>	<b>390252(100)</b>	<b>7845(100)</b>	<b>307116(100)</b>	<b>158475(100)</b>	<b>4860(100)</b>	<b>3048(100)</b>
Diglipur	43183(13.75)	125(5.52)	31259(13.36)	16384(14.28)	333(12.73)	1459(20.61)
Mayabunder	25788(8.21)	189(8.35)	19610(8.38)	9237(8.05)	369(14.11)	548(7.74)
Mayabunder (RV)	2845(0.91)	46(2.03)	2064(0.88)	1197(1.04)	0	0
Pokadera (RV)	1922(0.61)	30(1.33)	1543(0.66)	755(0.66)	7(0.27)	3(0.04)
Karmatang (RV)	1229(0.39)	18(0.80)	906(0.39)	344(0.30)	26(0.99)	12(0.17)
Pahalgaon (RV)	1468(0.47)	7(0.31)	1187(0.51)	678(0.59)	0	4(0.06)
Rangat	36626(11.66)	444(19.61)	27814(11.89)	12958(11.30)	171(6.54)	353(4.99)
Rangat (RV)	3784(1.20)	34(1.50)	3148(1.35)	1508(1.31)	8(0.31)	2(0.03)
Parnasala (RV)	1004(0.32)	11(0.49)	733(0.31)	281(0.24)	1(0.04)	13(0.18)
Kadamtala (RV)	3008(0.96)	10(0.44)	2232(0.95)	998(0.87)	15(0.57)	116(1.64)
Santanu (RV)	1202(0.38)	29(1.28)	901(0.39)	393(0.34)	0	13(0.18)
Long Island (RV)	1028(0.33)	36(1.59)	785(0.34)	320(0.28)	0	1(0.01)
Nilambur (RV)	1498(0.48)	58(2.56)	1146(0.49)	559(0.49)	2(0.08)	0
Others	11583(3.69)	7(0.31)	8779(3.75)	3840(3.35)	223(8.52)	207(2.92)
<b>2. North &amp; Middle Andaman</b>	<b>314050 (100)</b>	<b>2264(100)</b>	<b>233987(100)</b>	<b>114703(100)</b>	<b>2616(100)</b>	<b>7079 (100)</b>
Car Nicobar	17841(28.83)	15027 (35.03)	12627 (29.58)	8844 (30.37)	14 (11.76)	41 (20.40)
Mus	1553 (2.51)	1481 (3.45)	1114 (2.61)	812 (2.79)	-	3 (1.49)
Sawai	1247 (2.02)	1212 (2.82)	927 (2.17)	822 (2.82)	-	3 (1.49)
Arong	1194 (1.93)	1117 (2.60)	887 (2.08)	527 (1.81)	4 (3.36)	1 (0.50)
Kakana	841 (1.36)	838 (1.95)	559 (1.31)	299 (1.03)	-	-
Malacca	1637 (2.65)	1362 (3.17)	1170 (2.74)	807 (2.77)	-	11 (5.47)
Perka	2527 (4.08)	1709 (3.98)	1684 (3.94)	1057 (3.63)	3 (2.52)	4 (1.99)
Tamaloo	1515 (2.45)	1481 (3.45)	1005 (2.35)	804 (2.76)	-	-
Kinyuka	1120 (1.81)	1073 (2.50)	733 (1.72)	323 (1.11)	1 (0.84)	2 (1.00)
Tapoiming	941 (1.52)	851 (1.98)	657 (1.54)	338 (1.16)	-	10 (4.98)
Big Lapati	1098 (1.77)	1057 (2.46)	736 (1.72)	657 (2.26)	3 (2.52)	1 (0.50)
Small Lapati	938 (1.52)	920 (2.14)	699 (1.64)	381 (1.31)	3 (2.52)	2 (1.00)
Kinmai	574 (0.93)	541 (1.26)	376 (0.88)	367 (1.26)	-	1 (0.50)
Nancowry	10634(17.19)	7440 (17.34)	6796 (15.92)	4440 (15.25)	9 (7.56)	37 (18.41)
Hinnunga	124 (0.20)	118 (0.28)	90 (0.21)	38 (0.13)	-	-
Campbell Bay	8367 (13.52)	1214 (2.83)	5909 (13.84)	3841 (13.19)	80 (67.23)	52 (25.87)
<b>4. Others</b>	<b>9723 (15.71)</b>	<b>5462 (12.73)</b>	<b>6719 (15.74)</b>	<b>4767 (16.37)</b>	<b>2 (1.68)</b>	<b>33 (16.42)</b>
<b>5. Nicobar</b>	<b>61874 (100)</b>	<b>42903 (100)</b>	<b>42688 (100)</b>	<b>29124 (100)</b>	<b>119 (100.00)</b>	<b>201 (100)</b>

Source: Statistical abstract of A & N Islands, 2017-18, Figures in parenthesis % to total

Table 2. Frequency of Noni used for healing purposed by the informants

Categories education	Based on	How often noni used as medicine (%)			Reasons of noni used for health treatments*(%)			
		Always	Some times	Never	Locally available	Cheaper	Known by ancestor	Observed benefits
Illiterate		45	24	31	92	93	49	35
Up to primary		32	26	42	84	65	46	28
Up to higher secondary		18	23	59	65	78	53	15
Above higher secondary		14	9	77	62	59	47	24

\*Perceptions of Noni users

Table 3. Human Health related problems and diagnosis through *Morindacitrifolia*

Type of disorder	Diagnosis and prescription for respiratory Disorders	Part Used
1. Relives cough	Leaves of noni along with lemon grass boiled in water and given orally.	Leaves
2. Tuberculosis	Juice of green mature fruit orally and leaves of noni along with lemon grass boiled in water and given orally. The person is also given topical application of coconut oil prepared by heating with leaf and flower of noni all over the body.	Fruits & Leaves
3. Asthma	Juice of green noni along with decoction of root bark.	Fruits
<b>Diagnosis and prescription for Digestive disorder</b>		
4. Stomach ache	Juice of leaf and green fruit mixed and give orally and the leaves are gently heated and warped around the stomach.	Leaves
5. Stomach ulcers	Paste of leaf with tender coconut given orally	Leaves
6. Constipation	Paste of ripe fruit along with seeds orally given.	Leaves
7. Sore throats	After gargling with water boiled with leaves and a pinch of salt, the green or mature fruit pulp grinded with coconut oil is applied.	Leaves & fruit
8. Mouth and Gum infections	The paste of immature fruits is applied on the affected area.	fruits
9. Appetizer	The fruit juice given orally	fruits
10. Diarrhea	The juice of immature fruits is given along with immature banana.	fruits
11. Urinary tract Disorders	Urinary tract infections: the extract of leaf in lukewarm water is given orally	Leaves
12. Reproductive tract, Menstrual and cramps disorders	Both the leaf extract and fruit extract is given orally.	Fruit & Leaves
13. Hypertension	The extract of leaf mixed with extract of stem bark is given along with noni juice.	Leaves
<b>Diagnosis and prescription for Skeletal system</b>		
14. Bone fracture	Manually the fracture is corrected and the leaves of noni are heated and wrapped around the site and then pieces of bamboo are placed over it and then again, the leaves are wrapped around it and tied.	Leaves
15. Sprain	The leaves are heated and wrapped around the site	Leaves
16. Rheumatism	The noni juice is given along with extract of root bark in coconut water orally and the paste of leaf in coconut oil is applied to the site.	Roots & Leaves
<b>Miscellaneous alignments</b>		
17. Head Ache	The leaf is wrapped on the forehead to reduce headache	Leaves
17. Nausea	Leaf extract is given orally to subside the effects.	Leaves
18. Diabetes	It used with coconut oil.	Leaves
19. Jaundice	The stem bark is soaked in water overnight and then paste is made and diluted in coconut water and give orally.	Stem
20. Hernias	The paste of leaves in coconut oil is applied externally and then wrapped with hot leaves.	Leaves
21. Abscesses	The paste of leaves, immature fruits and salt is applied over the site.	Leaves
22. Cuts and wounds	the fruits are cut and placed over the surface of cut and wound	Fruits
23. Skin problems	The seed of ripe noni is grinded with coconut oil and dwarfed and applied all over the skin.	seed
24. Eye conditions	The extract of flower is used as eye drops and in some case the flower pastes is applied over the eyelid.	Flower
25. Fever	The paste of flower is rubbed on the fore head and neck region.	
26. Brain stimulator	Daily intake of fruit juice or raw fruits along with salt.	Fruits
27. Insect repellent	The seed I for smoking which act as insect repellent.	seeds

Source: Survey data on tribal perception

Table 4. Perception on healing of different alignments through Noni (Scale 0-1)

Extent of effectiveness ( <i>Morindacitrifolia</i> )								
Low (Up to 0.50)			Medium (0.5 to 0.70)			High (>0.70)		
Name of alignment	Mean	Std.	Name of alignment	Mean	Std.	Name of alignment	Mean	Std.
Hernias	0.47	0.23	Abscesses	0.51	0.25	Diabetes	0.81	0.28
Jaundice	0.48	0.22	Insect repellent	0.51	0.26	Menstrual regulation and cramp	0.81	0.21
Fever	0.48	0.21	Skin problems	0.52	0.21	Brain stimulator	0.82	0.18
Sore throats	0.49	0.22	Stomach Ulcer	0.53	0.24	Stomach ache	0.83	0.25
Reproduction	0.50	0.20	Diarrhea	0.53	0.22			
Hypertension	0.50	0.24	Bone fracture	0.53	0.24			
			Constipation	0.53	0.23			
			Sprain	0.53	0.21			
			Tuberculosis	0.55	0.25			
			Skeletal system	0.55	0.25			
			Nausea	0.55	0.22			
			Mouth and gum infection	0.56	0.27			
			Urinary track disorder	0.61	0.25			
			Asthma	0.62	0.25			
			Rheumatism	0.65	0.28			
			Appetizer	0.65	0.25			
			Cuts and wounds	0.66	0.26			
			Relives cough	0.67	0.28			
			Eye conditions	0.70	0.24			
			Headache	0.70	0.25			

Source: People's perception received during the survey.

noni as medicine to cure disease. The possible reason for less consumption of noni among educated people, because they might be depending on government hospital which is free for them and they might have more aware about allopathic treatment as fast relief options. Further, main reasons of noni uses as a medicine was due to locally availability and accessibility across the different literacy class varies from 65 to 92. However, cost effectiveness, easy accessibility and known through ancestor was major factor among less educated people to use noni for disease control. Some of the key informants have explained the use of noni due to effectiveness for some of the critical diseases. About 65% literate people have replied that we use noni because of based on our past experiences. Therefore, majority of respondents were in opinion of noni is useful in curing of different alignments.

**Human Health related problems and diagnostic use of Noni:** The survey and interaction with the tribal key informants revealed that many uses of *Morindacitrifolia* for disease cure. There are several plants species including noni are used for treatment of many health alignments by the tribal. It was revealed that tribal even consume this fruit raw with salt and they cooked as vegetable recipe. The methods of treatment by *Morindacitrifolia* practiced by Nicobarites revealed that Nicobarites use *Morindacitrifolia* for various ailments/treatments.

Noni traditionally has been used for colds, flu, diabetes, anxiety, and high blood pressure, as well as for depression and anxiety. All parts of plant are used for a variety of illnesses in Samoan culture, and noni is one of the most frequently used in USA as plant medicines. Research studies have pointed out that all parts of noni i.e., leaves, flowers, fruits, seeds, bark, stem and roots are used for many health treatments. The fresh fruit juice for cancer; the dried leaves used externally for infections, burns, children's chest colds, and inflammation, and internally for boils, pleurisy, inflamed gums, and arthritic pain. The fresh leaves used externally for burns and internally for fevers, hemorrhage, bacterial infections, and inflammation; and the roots for oral ulcerations, fevers, and cancerous swellings. In figure 4 some of the tribal have demonstrated how they apply noni muscles and bone treatment. Further this plant is found in their backyard gardens indicating how important this plant for tribals.

**Informant's perceptions on effectiveness of Noni uses:** We use the key informants information for understanding the extent of effectiveness of Noni uses for different healing purpose and same is presented in table 5. It was observed that informants use Noni for different alignments and at low level of use and effectiveness was six disorders (*Hernias, Jaundice, fever, throat infections, hypertension and reproduction*). Similarly, respondent's perceived more than 20 disorders cured with the consumption *morindacitrifolia* under 0.5 to 0.70 scale and categorized as moderately effective. Even some of the respondents have reported very effective in some the disorder as scale value was >0.70. Therefore, it could be inferred from the tribal's perception that use Noni for health treatment and it is an integral part of their life support system in these islands. However, respondents could not explain how far they are near to reality. It is because they also take the allopathic medicines along with the *morindacitrifolia*. The standard deviation values indicate that there was no much variation in the opinion of the respondents as Standard Deviation (SD) values were small (SD, 0.20 to 0.28). Therefore, based on the people's perceptions, noni is an important plant for their day-to-day

treatments. Hence, pharmaceuticals industry and local herbal practitioners should work together to exploit economic use of this plant. Same time existing tribal wisdom can be conserved and protected through research and policy instruments.

## CONCLUSION

The World Health Organization (WHO) has estimated that more than 80 % of the world population relies on traditional medical practices for primary health care needs. This is because the traditional medicines are relatively accessible, inexpensive, accessible and has. Literature showed that *M. citrifolia* contains many phytochemicals and the researchers may need to put efforts to utilize the therapeutic potential of Noni. This study is a comprehensive survey carried out covering all the villages of the Nicobar Islands with systematic documentation. The study concludes that the older generations were having the knowledge of traditional medicine for treatment of different disorders. The Nicobarites used every parts of the plant in one way or another in treating different alignment. They opined that the plant energizes the body and thereby kills infections and cure diseases viz. respiratory tract disorder, digestive disorders, circulatory disorder, skeletal disorder and many more. The roots, stems, bark, leaves, flowers and fruits of the noni plant are used in various combinations for herbal remedies. Therefore, this is high time to conserve and document the traditional knowledge of the tribal for their interest and for interest of the nation. More research and documentation should be carried out for conservation of tribal wisdom. Similar ethno medicinal observations also indicate the use of fresh plant materials for remedy preparations (Yineger *et al.*, 2008; Lulekal *et al.*, 2013). However, future phytochemical and pharmacological studies are needed to confirm the efficacy and safety aspects of the identified plants. Established marketing values dictate that rewards should be given to those who make original contributions to knowledge, provide information for scientific research on Noni.

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