Exploration of wild medicinal plants for better livelihood options for the tribal population of forest fringe villages

Manish Kumar Singh, Dinesh Meena, Rajarishi Bhattacharyya, Mahima Arya and Kumar Avinash Bharati

Abstract

Tribal’s dwelling forest fringe villages use wild medicinal plants to cure various ailments, but due to been fading of this traditional knowledge the documentation of this treasurable information is call of today. With this aims, the present study were undertaken to document wild medicinal plants found in forest fringe villages and utilized by tribals of Kaziranga National Park (Assam) for their health care management. Field trips were conducted over a period of two years, utilizing the “transect walk” method of participatory rural appraisal (PRA) and data were analyzed through Use-value valuation technique. This study documented 61 medicinal plants which were used to treat 32 human ailments. The most useful medicinal plants, ranked according to use value were: Rauwolfia serpentina, Ocimum sanctum, Vetiveria zizanioides, Dioscorea alata, Oroxylum indicum, Randia spinosa, Triumfetta rhomboidea and Gnetum montanum. Among the tribes, Mishing tribal people are using maximum number of wild medicinal plant and collected them mainly form wild.

Keywords: Medicinal plants, fringe villages, transect walk, PRA, mishing tribe

Introduction

The forest of Assam is endowed with great plant wealth, due to its unique climatic conditions and because to that Assam falls under one of the recognized mega biodiversity zones of the world. This region is also home to numerous others, smaller ethnic groups which utilize this diverse plant wealth for their primary health care needs (WHO, 2013) [17]. With the passage of time, these tribes have acquired the knowledge of economic and medicinal properties of many wild plants by trial and error methods and thus they became the repository of knowledge of their surrounding plants (Singh, et. al, 2018) [14]. This traditional knowledge were cumulated and delivered on from one age group to the other orally (Kumar et al, 2013) [6] which is very much region specific culturally and socially. However, due to the persuade of modernization youths are wandering towards cities in search for better livelihood options and thus are diminishing the chain of knowledge transfer, from one generation to the other (Shukla and Chakravarty, 2012) [13]. Also due to indiscriminate exploitation, obliteration of forests and shifting scenario of rural standard of living, the spoken folklore of plants as well as the knowledge is in the process of degeneration (Singh, et. al, 2018) [14]. Literature review also tells that very little attention has been paid in the past regarding measurement of the floristic composition and ethno-botanical study of the forest fringe villages of Assam. Therefore, it is significant to study, document and prepare an inventory of existing information concerning ethnobotanical plant used by the tribal community dwelling forest fringe villagesand to classify the pattern of ethnobotanical plant use in the research area in detail for a wider application in future. Keeping this in mind, this study were undertaken with the below mentioned objectives, in 12 different forest fringe villages of Kaziranga National Park of Assam:

1. To document different varieties of traditionally used medicinal plants utilize by inhabitant tribes of forest fringe villages of Kaziranga National Park (Assam).
2. To study growing status and conservation status of these medicinal plant in Forest Fringe villages.
Materials and Methods

Study Area
Twelve forest fringe villages namely Agerata, Kandhulin, Japari Pathar, Damojan, Bachagaon, Mohpara, Hatikuti, Sildubi, Haldibari, Harmati, Kuthari, Bandar dubi which lies from East to west direction along Kaziranga National Park (KNP) of Assam were selected (Fig.1). Kaziranga National Park, is located in the Kaliabor and Bokakhat subdivisions of Nagaon and Golaghat districts of Assam state, India. It slanders between latitude 26°30 N to 26°45 N and longitude 93°08 E to 93°36 E. It is around 40 kilometres long (approx. 25 miles) and 13 kilometres (approx. 8 miles) broad. The park is spread in 378.22 sq. km in and its complete area is confined by the Brahmaputra River that forms the eastern & northern boundaries and the Mora Diphlu that forges the southern boundary (https://www.kaziranga-national-park.com/kaziranga-location.shtml). The park experiences 3 seasons- summer, monsoon and winter. The dry and windy summer extend from February to May with mean maximum and minimums of 37 °C and 7 °C, respectively. The hot and humid Monsoon season extend from June to September. The winter, extending from November to February, is mild and dry, with the mean maximum and minimum being 25 °C (77 °F) and 5 °C (41 °F), respectively (Kushwaha & Unni, 1986)

Survey, data collection and analysis
Regular field surveys were conducted during the years 2016-2018, to document the wild medicinal plants, utilizing by inhabiting tribes. The methodology of Transect Walk method of a Participatory Rural Appraisal (PRA) was adopted (Henrich, et al. 2009; Albuquerque, et al. 2006) during field study. This method involves semi-structured interviews and talk with key participants such as, community elders, farmers and house-wives. Observances on status of wild medicinal plants were measured at 06 levels (DAFOR scale) i.e. Abundant, common, frequent, Sparse/ less frequent, rare and endangered (Cunningham, et al., 2001) To verify the local importance of each species, the use-value (UV) evaluation technique was adopted (Cunningham, 2001; Phillip, et al. 1993a, b) . A high use-value indicates a relatively important species.

\[
UV = \frac{\text{Number of uses mentioned by each informant for a given species}}{\text{Total number of informants}}
\]

The scientific names of the plant specimens were updated according to the Plant List (www.theplantlist.org). The nomenclatures of families are updated according to APG III system of classification (Kumar & Bharti, 2013; Sutherland, 2006). All plants were identified using available floras and by matching the specimens with the herbaria of Botanical Survey of India, Shillong. Local markets or hats were also visited to study the plants and plant products sold there.

Fig 1: Geographical location of Kaziranga National Park in Assam and location of forest fringe villages.
Result & Discussion

The fringe villages of Kaziranga National Park, have been colonized by people belonging to diverse communities and tribes, the prominent among them are the Karbi, the Mishing and the Mikir tribes. Each tribal group has its own distinctive culture, tradition and uses the forest products not only for their livelihood but also to cure various ailments they suffer from.

Ethnobotanical Richness

A total number of 61 wild medicinal plants which belongs to 53 families, utilized in one form or the other by ethnic tribes dwelling forest fringe villages of KNP were documented. The detailed information regarding the scientific names, local names, families, habit, parts used, therapeutic uses, conservation status, growing status etc. were presented in Table-1 and the photographs of some of the plants are given in figure 5-16.

During the study period, a high degree of informant consensus for each species was observed. Among the documented wild medicinal plants, herbs dominated the list with 26 species (15% planted, 15% wild while 14% both growing as wild or planted) followed by trees with 17 species (5% planted and 7% wild while 14% growing either as wild or domesticated), shrubs with 10 species (5% planted and 2% wild while 10% growing both as wild and planted), vine with 4 species (2% planted, 2% wild and 3% both domesticated or collected from wild), climber with 3 species (2% each planted, wild and both planted/ collected from wild) and least used was a creeper known as Hiptage benghalensis, collected from wild (Fig. 2).

Table 1: Documented wild medicinal plants used by the tribes of Forest fringe villages of Kaziranga National Park.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Abundant</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Cynodon dactylon (L.) Pers.</strong> (Poaceae) RFRIH-160</td>
<td><strong>Allium sativum</strong> (Linn.) (Liliaceae) RFRIH-168</td>
</tr>
<tr>
<td></td>
<td><strong>Doob</strong></td>
<td><strong>Kumpun talap</strong></td>
</tr>
<tr>
<td></td>
<td>Fresh juice of durva is given in a dose of 15-20 ml in conditions of epileptic seizures and psychosomatic disorders also as eye drops to reduce the reddishness, burning sensation and treat the condition.</td>
<td>Preparation of garlic is used in pulmonary phthisis, gangrene of the lungs and whooping cough. For cough, ash obtained from dried peels of ripe <em>M. balbisiana</em> fruit is soaked whole night in water, and filtrate is obtained. One cup of filtrate is mixed with a little amount of mustard oil, common salt and 3-4 pieces of crushed <em>A. sativum</em>. Mixture is slightly heated and allowed to take with freshly prepared rice, preferably in the morning for a week.</td>
</tr>
<tr>
<td></td>
<td>Year round (whole plant)</td>
<td>Year round (tuber)</td>
</tr>
<tr>
<td></td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>K, M, Mk</td>
<td>K</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Basella alba</strong> Linn. (Basellaceae)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Kumpun puroioying</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Juice of leaves given to children and pregnant woman to remove</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Year round (whole plant)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>PI</td>
<td>K</td>
</tr>
<tr>
<td>No.</td>
<td>Name of plant</td>
<td>Family</td>
</tr>
<tr>
<td>-----</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>4.</td>
<td>Costus speciosus (Koen.) Sm. (Zingiberaceae) RFRHI-179</td>
<td>Zingiberaceae</td>
</tr>
<tr>
<td>5.</td>
<td>Crataeva unilocularia (Capparaceae) RFRHI-117</td>
<td>Capparaceae</td>
</tr>
<tr>
<td>6.</td>
<td>Dioscorea pentaphylla L. (Dioscoreaceae) RFRHI-136</td>
<td>Dioscoreaceae</td>
</tr>
<tr>
<td>7.</td>
<td>Kydia calycina Roxb. (Malvaceae) RFRHI-193</td>
<td>Malvaceae</td>
</tr>
<tr>
<td>8.</td>
<td>Musa balbisiana Colla. (Musaceae) RFRHI-180</td>
<td>Musaceae</td>
</tr>
<tr>
<td>9.</td>
<td>Randia spinosa Thunb. (Rubiaceae) RFRHI-70</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>10.</td>
<td>Zingiber officinale Rosc. (Zingiberaceae) RFRHI-93</td>
<td>Zingiberaceae</td>
</tr>
<tr>
<td>11.</td>
<td>Rauwolfia serpentina Benth.Ex Kurz. (Apocynaceae) RFRHI-87</td>
<td>Apocynaceae</td>
</tr>
<tr>
<td>12.</td>
<td>Basella ruba Linn. (Basellaceae) RFRHI-127</td>
<td>Basellaceae</td>
</tr>
<tr>
<td>13.</td>
<td>Carica papaya Linn. (Caricaceae) RFRHI-181</td>
<td>Caricaceae</td>
</tr>
<tr>
<td>14.</td>
<td>Cassia fistula L. (Caesalpinaceae) RFRHI-186</td>
<td>Caesalpinaceae</td>
</tr>
<tr>
<td>15.</td>
<td>Cissampelos perpeira L. (Menispermaceae) RFRHI-141</td>
<td>Menispermaceae</td>
</tr>
<tr>
<td>16.</td>
<td>Citrus aurantifolia Christm. (Rutaceae) RFRHI-176</td>
<td>Rutaceae</td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td><strong>Common Name</strong></td>
<td><strong>Pharmacological Uses</strong></td>
</tr>
<tr>
<td>------------</td>
<td>----------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><em>Dioscorea alata</em> L.</td>
<td>Kathalu</td>
<td>Tuber consider anthelmintic; also used in leprosy and piles.</td>
</tr>
<tr>
<td><em>Flacourtia jangomas</em></td>
<td>poniol</td>
<td>Leaves and young shoots astringent and stomachic, used in diarrhoea and as a diaphoretic; fruits used in biliousness and other liver complaints.</td>
</tr>
<tr>
<td><em>Emblica officinalis</em></td>
<td>Amloli, Amlai, Amla,</td>
<td>Fruit sour and astringent, cooling, diuretic, laxative and have anti-inflammatory, antulcer, hepatoprotective, and anticancer actions.</td>
</tr>
<tr>
<td><em>Eupatorium odoratum</em></td>
<td>Sumyo yunrangi, Asamia, Bamvara</td>
<td>During cut injury, crushed leaves of <em>E. odoratum</em> are applied to the cut injury.</td>
</tr>
<tr>
<td><em>Flemingia strobilifera</em></td>
<td>Makhiyati</td>
<td>For ringworm infection, plant extract is applied over the infected area three times daily until cure.</td>
</tr>
<tr>
<td><em>Homonia riparia</em></td>
<td>Hil-kadam, Tuipui-sulhla</td>
<td>A decoction of the root is a laxative and diuretic and is used in piles, stone in the bladder, gonorrhoea, syphilis and thirst.</td>
</tr>
<tr>
<td><em>Magolia pterocarpa</em> Roxb. Syn. <em>M. sphenocarca</em> (Magnoliaceae)</td>
<td>Boromthuri sopa, Thouwua, Dolot sopa</td>
<td>Flower use to treat menstrual cramps, improve respiratory health, detoxify the body, boost cognition, prevent cancer, soothe the digestive system, stimulate the appetite, reduce stress, and protect against severe allergic reactions.</td>
</tr>
<tr>
<td><em>Nymphaea nouchali</em> Barn. (Nymphaeaceae)</td>
<td>Kumud</td>
<td>Flower mainly used to treat indigestion</td>
</tr>
<tr>
<td><em>Ocimum sanctum</em> Linn. (Lamiaceae)</td>
<td>Tulosi, Tulsi</td>
<td>For curing allergy, O. sanctum and <em>C. domestica</em> plant extract are applied on the affected areas thrice daily, till recovery.</td>
</tr>
<tr>
<td><em>Polygala chinensis</em> L. (Polygalaceae)</td>
<td>Meradu</td>
<td>Infusion of leaves given in asthma; roots used in fever and dizziness.</td>
</tr>
<tr>
<td><em>Sacccharum officinarum</em> Linn. (Poaceae)</td>
<td>Kuhiyar</td>
<td>For curing allergy, finely crushed <em>Z. officinale</em> mixed with old molasses obtained from <em>S. officinarum</em> is applied over the affected part, three times daily, until cure.</td>
</tr>
<tr>
<td><em>Stellaria media</em> L. (Caryophyllaceae)</td>
<td>Morolia</td>
<td>used to treat constipation, upset stomach and to promote digestion; it also used in lung problems</td>
</tr>
<tr>
<td><em>Sycsygium cumini</em> (L.) Skeels (Myrtaceae)</td>
<td>Jamo</td>
<td>The bark is acrid, sweet, digestive, astringent to the bowels, anthelmintic and used for the treatment of sore throat, bronchitis, asthma, thirst, biliousness, dysentery and ulcers. It is also a good blood purifier.</td>
</tr>
<tr>
<td><em>Trichosanthes anguina</em> Linn. (Cucurbitaceae)</td>
<td>Tumpat</td>
<td>During epilepsy, outer portion of T. anguina fruit is crushed and pills made out of it are taken three times daily.</td>
</tr>
<tr>
<td><em>Triunefta rhomboidea</em> Jacquem. (Tiliaceae)</td>
<td>soru ogora</td>
<td>treat stomachache, indigestion, and to treat fever during menstruation</td>
</tr>
<tr>
<td><em>Vetiveria zizanioides</em> L. (Poaceae)</td>
<td>Birina</td>
<td>Khas-Khas is used to treat gastrointestinal disorders like flatulence and indigestion</td>
</tr>
<tr>
<td><em>Vigna mungo</em> (Linn.) Hepper</td>
<td>Paret</td>
<td>For backache, powdered seeds of <em>V. mungo</em> mixed with small amount of</td>
</tr>
</tbody>
</table>
34. *Vitex negundo* Linn. 
(Fabaceae) RFRRIH-163  
Pochotia, Nisinda  
Using portion of *V. negundo* is crushed finely and applied over the infected eczema portion thrice daily.  
Year round (seeds)  
0.01  
S  
W  
Ms, Mk

35. *Gmelina arborea* L. 
(Verbenaceae) RFRRIH-113  
Gomari  
The juice of young leaves has been used to treat gonorrhoea and as a cough medicine. The leaf juice has also been used externally to treat ulcers. A paste of the leaves has been applied to treat headaches associated with fever; fruit has been included in cooling decoctions given for fevers.  
May-June (fruits), year round (leaves)  
0.01  
T  
Pl/W  
K, Ms

36. *Gnetum montanum* M.G.F. 
(Gnetaceae) RFRRIH-118  
Mameilet, thanlping-rhui  
The root is used as a general antidote to poisons and also used as a remedy for malaria.  
Year round (roots)  
0.09  
WL  
Pl/W  
K, Ms

37. *Oroxylum indicum* (L.) Bent. 
(Bignoniaceae) RFRRIH-142  
Ghila yesing, Kanaidingi, Totola  
For diabetes, about 6cc of using portion of *B. cieba* and *O. indicum* are crushed and soaked in two litre of water for whole night and the decoction is administered in the morning after breakfast on alternate days for about two weeks.  
Jul.-Aug. (flower); Oct.- Dec. (fruit); yearround (root, bark, leaf)  
0.09  
T  
Pl/W  
Ms

38. * Dioscorea bulbifera* L. 
(Dioscoreaceae) RFRRIH-167  
Kathalu, Matialu  
Improves sperm and semen quantity and quality; helpful in throat infection and related disorders; improves strength and immunity.  
Tubers harvest during winter i.e. Dec.- Jan.  
0.05  
C (climber)  
W  
K

39. *Dillenia indica* L. 
(Dilleniaceae) RFRRIH-174  
Owtenga  
The fruits and the juice of the plant are traditionally used for the treatment of Diabetes Mellitus, to treat dranduff and falling hairs; bark and leaves were mixed and given orally for the treatment of cancer and diarrhea also used as a laxative and astringent.  
April-July (fruits)  
0.02  
T  
Pl/W  
K, Ms

(Cucurbitaceae) RFRRIH-183  
Thebou-lata, taponguti  
The ashes from burnt leaves are also used to heal wounds; the fruit bulb is applied to bacterial infections in the feet.  
Year round (leaves & fruits)  
0.02  
V  
W  
K, Ms, Mk

41. *Oxalis corniculata* Linn. (Oxalidaceae) RFRRIH-107  
Botene tengeshi  
It is very effective herb used for treating stomach and liver problems  
Year round (whole plant)  
0.01  
H  
W  
K, Ms

42. *Stephania hermandifolia* (Wild.) Walp. 
(Menispermaceae) RFRRIH-79  
Tubuki lota  
The leaves of this plant are used as a purgative and emetic, whereas the roots are employed in the treatment of roundworm, menorrhagia and boils.  
Year round (whole plant)  
0.03  
H  
W  
Ms, Mk

43. *Stereospermum personatum* (Hassk) Chatt. 
(Bignoniaceae) RFRRIH-206  
Parul, Parolli, Pareya-auwal  
It is used in snake bite, scorpion bite, vomiting etc. It is also used for neuro-protective and hepatoprotective benefits.  
Year round (root bark, flowers and tender fruits)  
0.01  
H  
W  
Ms

44. *Urena lobata* L. 
(Malvaceae) RFRRIH-192  
Sampakpi  
Flower expectorant; their infusion used in aphthae and sore throat; decoction of stem and roots used for flatulent colic.  
Year round (whole plant)  
0.01  
H  
W  
Ms

45. *Terminalia bellirica* Roxb. 
(Combretaceae) RFRRIH-201  
Haritaki  
It has also been used for asthma, bile duct disorders, scorpion stings, and poisonings  
March - May (fruits)  
0.06  
T  
W  
Mk

(Combretaceae) RFRRIH-84  
Kathal  
Fruits are anti-inflammatory and astringent in nature and it is also helpful in urinary tract infections; also effective in gout, asthma and hiccups.  
Jan. - Mar. (fruits)  
0.09  
T  
W  
K, Ms, Mk
<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Uses</th>
<th>Harvest Time</th>
<th>Medicinal Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.</td>
<td><em>Adhatoda vasica</em> Nees (Acanthaceae) RFRIH-159</td>
<td>Titabahak, Bahak, Konkani</td>
<td>Sept.- Feb. (leaves, roots &amp; flower)</td>
<td>0.03</td>
</tr>
<tr>
<td>48.</td>
<td><em>Artemisia nilagirica</em> (Cl.) pamp. (Asteraceae) RFRIH-182</td>
<td>Nilum</td>
<td>Aug.-Oct. (fruits)</td>
<td>0.02</td>
</tr>
<tr>
<td>49.</td>
<td><em>Bombax ceiba</em> Linn. (Bombacaceae) RFRIH-118</td>
<td>Singi, Semul</td>
<td>May-Jun. (fruits); Year round (leaf, root)</td>
<td>0.02</td>
</tr>
<tr>
<td>50.</td>
<td><em>Cleome gynandra</em> L. (Cleomaceae) RFRIH-106</td>
<td>Bhutmulla</td>
<td>Year round (leaves)</td>
<td>0.02</td>
</tr>
<tr>
<td>51.</td>
<td><em>Curcuma domestica</em> Valeton (Zingiberaceae) RFRIH-191</td>
<td>Halodhi</td>
<td>Rhizome harvest when foliage dies in winter</td>
<td>0.04</td>
</tr>
<tr>
<td>52.</td>
<td><em>Garcinia tinctoria</em> (Dc.) Wight (Clusiaceae) RFRIH-115</td>
<td>Cuiithekera, Kangach, Kujithekera</td>
<td>A decoction of rind is given in rheumatism and bowel complaints.</td>
<td>April- July (Fruits)</td>
</tr>
<tr>
<td>53.</td>
<td><em>Hiptage benjhalensis</em> (L.) Kurz. (Malpighiaceae) RFRIH-250</td>
<td>Kerek-lata</td>
<td>Year round (whole plant)</td>
<td>0.01</td>
</tr>
<tr>
<td>54.</td>
<td><em>Laeya spinosa</em> Thw. Syn. L. heterophylla Schott; L. aculeata Lou. (Araceae) RFRIH-133</td>
<td>Kanta kachu</td>
<td>Plant use for colic rheumatism and intestinal diseases; juice of root-stock used for piles.</td>
<td>Year round (whole plant)</td>
</tr>
<tr>
<td>55.</td>
<td><em>Leucas aspera</em> Spreng. (Lamiaceae) RFRIH-172</td>
<td>Takom Kori</td>
<td>Year round (whole plant)</td>
<td>0.03</td>
</tr>
<tr>
<td>56.</td>
<td><em>Portulaca oleracea</em> L. (Portulacaceae) RFRIH-101</td>
<td>malbhog xaak</td>
<td>Herb use in disease of liver, spleen, kidney and bladder, also in cardiovascular disease, dysuria, haematuria, sore nipples and mouth ulcer.</td>
<td>Year round (whole plant)</td>
</tr>
<tr>
<td>57.</td>
<td><em>Ricinus communis</em> Linn. (Euphorbiaceae) RFRIH-105</td>
<td>Arena, Aranda, Varendra, Rahari</td>
<td>Using portion of R. communis is crushed finely and applied over the infected eczema portion thrice daily.</td>
<td>Year round (fruit/seed); year round (leaf, branches)</td>
</tr>
<tr>
<td>58.</td>
<td><em>Salmalia malabarica</em> Schott &amp; Endl. (Bombacaceae) RFRIH-75</td>
<td>Simolu</td>
<td>Gum is used to relieve sores and wounds on the skin, bladder disorders and gonorrhea</td>
<td>Year round (gum)</td>
</tr>
<tr>
<td>59.</td>
<td><em>Sesamum indicum</em> Linn. (Pedaliaceae) RFRIH-99</td>
<td>Til</td>
<td>For constipation, powdered S. indicum ripe and dry seeds mixed with equal amount of S. officinarum molasses is given thrice daily for two days.</td>
<td>August - October (Sesame oil)</td>
</tr>
<tr>
<td>60.</td>
<td><em>Sterculia villosa</em> Roxb. (Sterculiaceae) RFRIH-81</td>
<td>oudal</td>
<td>Leaves are used for the treatment of impotency; the bark and the petiole are used as a remedy in seminal weakness in jointiapur of Sylhet.</td>
<td>Year round (leaves, bark)</td>
</tr>
<tr>
<td>61.</td>
<td><em>Tamarix dioica</em> Roxb. (Tamaricaceae) RFRIH-334</td>
<td>Jhau, lal-jhau</td>
<td>used in traditional medicine as a diuretic and a carminative, as an astringent, and for the treatment of inflammation of the liver and</td>
<td>Year round (galls &amp; twigs)</td>
</tr>
</tbody>
</table>
An extract of the leaves has been shown to have antifungal activity.
Portulaca oleracea (Herb)

Leucas aspera (Herb)

Cleome gynandra (Herb)

Polygala chinensis (Herb)

Rauwolfia serpentina (Herb)

Vetiveria zizanioides (Herb)

Tamarix dioica (Shrub)

Vitex negundo (Shrub)
Regarding application of plant product, they are either applied Externally (E) or consumed Internally (I) or in both ways. Internal application of plants products by tribals is more frequent (48%) in the present study area than external applications (29%) whereas 21% were taken both internally and externally. Out of 32 ailments of human beings i.e. herbal medicines are applied externally in 18 ailments namely cut and wounds, body pain, boil, bone fracture, headache, joint pain, toothache, snake bite etc. and taken orally in 29 ailments viz. bleeding, blood purification, cough and cold, diarrhoea, hypertension, jaundice, dysentery, fever, indigestion, jaundice, malaria, stress, piles, stomach pain, uterine disorders etc.

Discussion
The observation emanating from the study accounts that, medicinal plants play a pivotal role in providing primary health care services to the tribal people inhabiting Forest Fringe villages of the Kaziranga National Park. Among the total species documented, 29 % species were planted by the indigenous communities, 41% species growing wild or collected from the forest for use and 29% species were both wild and planted. Also, it was observed that the herbs (43%) are the most important medicinal plants which are used largely by the local people, followed by the trees (28%), shrubs (16%), vines (6%), climbers (5%) and creepers (2%) respectively. Among the recorded families, most predominant were Poaceae & Zingiberaceae and among plant species Rauwolfiaserpen(tina) (Herb), Gnetum montanum (Woody liana), Oroxylum indicum (Tree), Triumfettarhomboidae (Shtub) were most extensively utilized. Among the tribal communities, Mishings tribes (49) use maximum number of ethnobotanical plant species followed by Karbis (35) and Mikirs tribes (33). Majority of the plant species (38) have more than one part that was medicinally important and majority of them used to treat multiple problems. The indigenous communities mainly used leaf (21%) of the plant for their ethnobotanical uses and also majority of preparation of the medicinal plants were consumed internally (48%). Several reports also recognized that leaves of the ethnomedicinal plants, were used to cure majority of remedies in traditional medicines (Murad et al., 2013; Mondal and Samanta, 2014; Amja et al., 2015) [10, 9, 8].

As this traditional knowledge which is surviving in their culture and oral transmission through generation is vanishing at a faster rate, due to over exploitation, demolition of forests and due to shifting of rural life style. Thus, it is essential to document this ethncial knowledge before it will wipe out and plan for conservation of our valuable forest resources. In this direction, our present study will be helpful in developing action plans for conservation, propagation, cultivation, processing and marketing of different medicinal plants. Also, this study will going to boost the rural health care sector, as well as going to provide better livelihood options to the tribal people of forest fringe villages.

Acknowledgement
The authors acknowledge tribals residing in fringe forest of Kaziranga National Park of Assam for sharing traditional knowledge and their active participation during the field
study. The authors are also gratifying Dr. A.A. Mao, Scientist Incharge, Botanical Survey of India, Shillong for their valuable help rendered during plant identification process. The first author is also expressing his gratitude to Dr. RSC Jayraj, Director, RFRI, Jorhat for his valuable suggestions and help rendered during the writing of this paper.

References