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RESEARCH ARTICLE

Plants used in anti-hepatitis and anti-influenza ethno-medicinal drug and supplement forms in Assam, India

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ABSTRACT

Few plants have significant therapeutic value used confidently in ethno-medicinal health care system in Assam. The present study highlights ethno-medicinal knowledge of certain plants of Sivasagar district in Assam, used by reputed practitioners and experienced users in raw therapeutic drugs and supplements forms for control and prevention of hepatitis and influenza. During 2008-2009, an ethno-medicinal survey cum investigation was conducted in 27 sample community villages of the district for exploration of hepato-protectative plants used knowledge and recorded 94 plants. Out of the total recorded plants, 26 are commonly used in anti-hepatitis and anti- influenza therapeutic drugs and supplements, while 11 plants are used in raw therapeutic drugs and 16 are used in medicinal supplements. The recorded plants are threatening in the district for several anthropogenic factors. The plants have pharmaceutical prospect.

Key words : Hepatitis, Influenza, Ethno-medicine, Sivasagar

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INTRODUCTION

Ethno-medicines are those alternative and complementary medicines, associated with biotic and a-biotic components of nature and closely linked with culture and traditions of ethnic communities and tribes in a particular geographical area or region of the world. The basic source of raw materials of ethno-medicines may be of flora, fauna, mineral or metal base origin of nature. Most of the ethno-medicinal drugs and supplements are formulated with the plant parts and products, which provide necessary vitamin, minerals and other active phytomolecules. Ethno-medicinal plants are those medicinal plants which are confidently used by ethnics for their primary health care and other purposes. Ethno-medicinal plants must be quality base, disease free and healthy, grown in toxic free sites and sunny places, effective for raw therapeutic drugs and medicinal supplements. Such medicinal plants are used by ethnics with their inherent knowledge base experiences for control and prevention of various ailments of human, pet animals, cultured crops and other purposes. A vast ethno medicinal knowledge of rural communities and tribes in India has been silently losing its attention for several anthropogenic and ecological causes, having its significant therapeutic values.

Liver problems are going to be a most serious problem in the world. Hepatitis is an inflammatory liver disease, caused mainly by viral infections A, B and C, auto-immune hepatitis, hepatitis secondary to fatty liver, alcoholic hepatitis and toxin induced hepatitis and several other unknown factors. In spite of the availability of more than 300 preparations for the treatment of jaundice and chronic liver diseases in Indian Systems of Medicine (using more than 87 Indian medicinal plants), only four terrestrial plants have been scientifically elucidated while adhering to the internationally acceptable scientific protocols (Mohamed Saleem *et.al.,* 2010). It is commonly known as jaundice. As per WHO report-2011, hepatitis kills more than one million people every year, one in twelve persons are estimated to be living with viral hepatitis. Hepatitis B is 100 times more infectious than HIV. Around 40millon people in India are infected with hepatitis B (The Hindu, Kolkata, and 26th July, 2011). As per Indian Council for Medical

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Research (ICMR) report-2011, Northeast India has highest incidence of hepatitis in the country. Highest percentage of Hepatitis C was recorded in Manipur, followed by Nagaland and Mizoram. In Assam hepatitis virus infection is more than hepatitis C (The Telegraph, Calcutta, India, and 25th July, 2011). Over 100 species of hepato-protective plants are used in different traditional health care systems in India for liver diseases. In World Hepatitis Day28 July, 2012, WHO have reported that 1.5 million people around the world are infected annually with Hepatitis A. Hepatitis B and C are two such viruses and together kill approximately one million people yearly and 500 million people around the world are currently infected with chronic hepatitis B or C and one in three people have been exposed to one or both viruses.

Again influenza and influenza like viral cum bacterial infections are another common diseases of the world, which is commonly known as flu. As per WHO reports 2010, about three to five million cases of severe illness, and about 2, 50,000 to 5, 00,000 deaths. There are three type of seasonal influenza- A, B and C. Type A influenza viruses are further typed into subtypes. Among many sub-types of influenza A viruses, currently influenza A (H_1N_1) and A(H_3N_2) sub-types are circulating among human. Newly detected H1N1 influenza virus has serious threat to human life, has damaged the respiratory system and collapses the body systems within few days along with secondary bacterial infections.

It is observed that communities and tribes in Sivasagar district of Assam traditionally use 300-400 medicinal plants in their ethno-medicinal health care system. In Sivasagar district, 42 locally grown edible herbs are confidently used by communities and tribes during hepatitis, while 17 such herbs are effective for all forms of hepatitis (Nath, 2011). Certain anti-hepatitis ethno-medicinal knowledge of the communities and tribes of Sivasagar are still to be explored. The widespread plants species having medicinal value will be extinct if not properly identified and propagated (Phukon and Nath, 2008). Therefore, treating hepatitis and influenza with plant-derived compounds which are confidently used in ethno-medicinal health care system of this region would be utilized in pharmaceutical industries with proper clinical trials and tests for human welfare. The objectives of the paper is to highlights certain medicinal plants of Sivasagar district, Assam used by reputed ethno-medicine practitioners and experience users in anti-hepatitis and anti-influenza therapeutic drugs and medicinal supplements forms and examine their present status in the district.

The study area, Sivasagar district of Assam is a unique part of Upper Brahmaputra Valley Agro-Climatic Sub-Region of East Himalayan Zone (Zone-2). It extends from $26^0$3' N to $27^0$15' N latitude and $94^0$23' E to $95^0$23' E longitude. Geographical area of the district is 2,668 sq. km. As per 2011 census, population of the district was 1150253, density of population was 431 people per sq. km. and literacy rate was 83.36 per cent. Temperature ranges from 8^0 C-38^0 C, average rain fall is 2600 mm. to 3200 mm. and relative humidity is above 86 per cent, elevation varies from 86 -150 meters from mean sea level. Major part the district is covered with new and old alluvial soil. Rich diversity of medicinal plants at various eco-system level and their traditional uses is a significant character of the district. Near about 40 per cent of the total population of the district is Tai-Ahom, followed by other communities and tribes.

MATERIALS AND METHODS

During 2008-2009, an ethno-medicinal survey cum investigation was conducted in Sivasagar district of Assam for exploration of hepato-protective plants used knowledge of communities and tribes. Along with the ethno-medicinal survey an investigation was conducted for anti-flu plants. The investigate design of the study is interdisciplinary. The problem will be studied in context of Sivasagar district of Assam (sub-division wise) in general and community village level in particular. For the study, 27 sample community villages were selected from three sub-divisions *viz.*, Nazira, Sivasagar and Charaideo. Respondents were selected for interview on the basis of the reliable information of the sample villagers. With purposefully designed questioner cum schedule and personal ethno-medicine practice experiences, respondents were interviewed and interacted personally with my personal practice experiences. Considering Intellectual Property Rights (IPR) data/ information were collected from 42 practitioners and 245 users and recorded 94 anti-hepatitis plants so far while 26 plants are commonly used by practitioners both for the treatments of hepatitis and influenza and influenza like fevers. Collected specimens were identified with the help of relevant literature of (Kanjilal *et al.*, 1934-1940; Islam, 1996; Borah, 2003; Dutta, 2004). Along with the special field tours, small scale tea gardens and reserve forests of the district were visited to know the present scenario of the plants in the district. During field tour, eco-climacteric characteristics of the sample villages and folk-culture of communities and tribes were noted down.

RESULTS AND DISCUSSION

The findings of the study have been discussed in detail as under:

Plants used as anti-hepatitis raw drug forms:

From the study based on investigation identified 11 plants which are commonly used by all practitioners and experienced users in anti-hepatitis raw drugs at certain therapeutic ratio along with few edible plant parts. The species are *viz.*, *Caesalipinia bonduc* (L). Roxb. (= *Guilandiana bonduc* L.) (=*C.Crispa* L.), *Drymaria cordata* (L).Willd.ex R. & S., *Euphorbia nerifolia* L., *Oroxylum indicum* (L.) Vent. *Sapindus*

mukorossii Gaertn. (= *S. trifoliatus* L.) (= *S. emarginatus* Vahl.), *Sida rhombifolia* L., *Solanum ferox* L., *Solanum viarum* Dunal. (=*S. khasianam* Cl.) (=*S.myriacanthum* Dunal.), *Tinospora cordifolia* (Willd) Hook.f.Th. *Tinospora crispa* (L.) Hook.f.Th. and *Zanthoxylum nitidum* (Roxb.) DC. (=*Z. Hamiltonianum* Wall.) (Table 1 and Fig. 1).

Out of these 11 reported plants, 7 effective for anti-hepatitis raw drugs. The species are *viz.*, *Caesalipinia bonduc* (L).Roxb.(= *Guilandiana bonduc* (L.) (=*C.Crispa* L.); *Drymaria cordata* (L).Willd.ex R. & S.; *Oroxylum indicum* (L.) Vent.; *Sida rhombifolia* L.; *Solanum ferox* L.; *Tinospora cordifolia* (Willd) Hook.f.Th. and *Tinospora crispa* (L.) Hook. f.Th. Most of the practitioners generally mixed two or three edible plants parts and products during raw drug formulation. It is found that anti-hepatitis raw drug doses are formulated in liquid forms while most of them are prepared in sugar base. Reputed ethno-medicine practitioners always follow some basic ethno-medicinal norms. Again raw parts and products of plants used knowledge are varying from practitioner to practitioner and community to community. Based on the types and nature of hepatitis, practitioners apply one to three types of drugs. During field tours, I personally interacted with the reputed practitioners and recorded the edible herbs, which they used in raw drug composition and advised to take during hepatitis infection. I applied 23 herbs in medicinal hepatitis practices as medicinal supplement forms for HB+ and got very good result after regular blood serum test up to three years. Dealing with hepatitis cases and practical experiences confirmed that few edible plants are effective for anti-hepatitis medicinal supplements formulation, where active bio-chemical composition of such plants have played significant role. It is again observed that during hepatitis infection all communities and tribes confidently used certain edible herbs as medicinal supplement forms.

Plants used as anti-influenza raw drug forms:

During influenza and influenza like fever the 11 reported plants are used by practitioners in therapeutic drugs. It was found that the 8 reported plants are commonly used in effective raw drugs formulation. The plants are *viz.*, *Caesalipinia bonduc* (L). Roxb. (= *Guilandiana bonduc* L.) , *Euphorbia nerifolia* L., *Oroxylum indicum* (L.) Vent. *Sapindus mukorossii* Gaertn. (= *S. trifoliatus* L.) (= *S. emarginatus* Vahl.), *Sida rhombifolia* L., *Solanum ferox* L., *Solanum viarum* Dunal. (=*S. khasianam* Cl.)

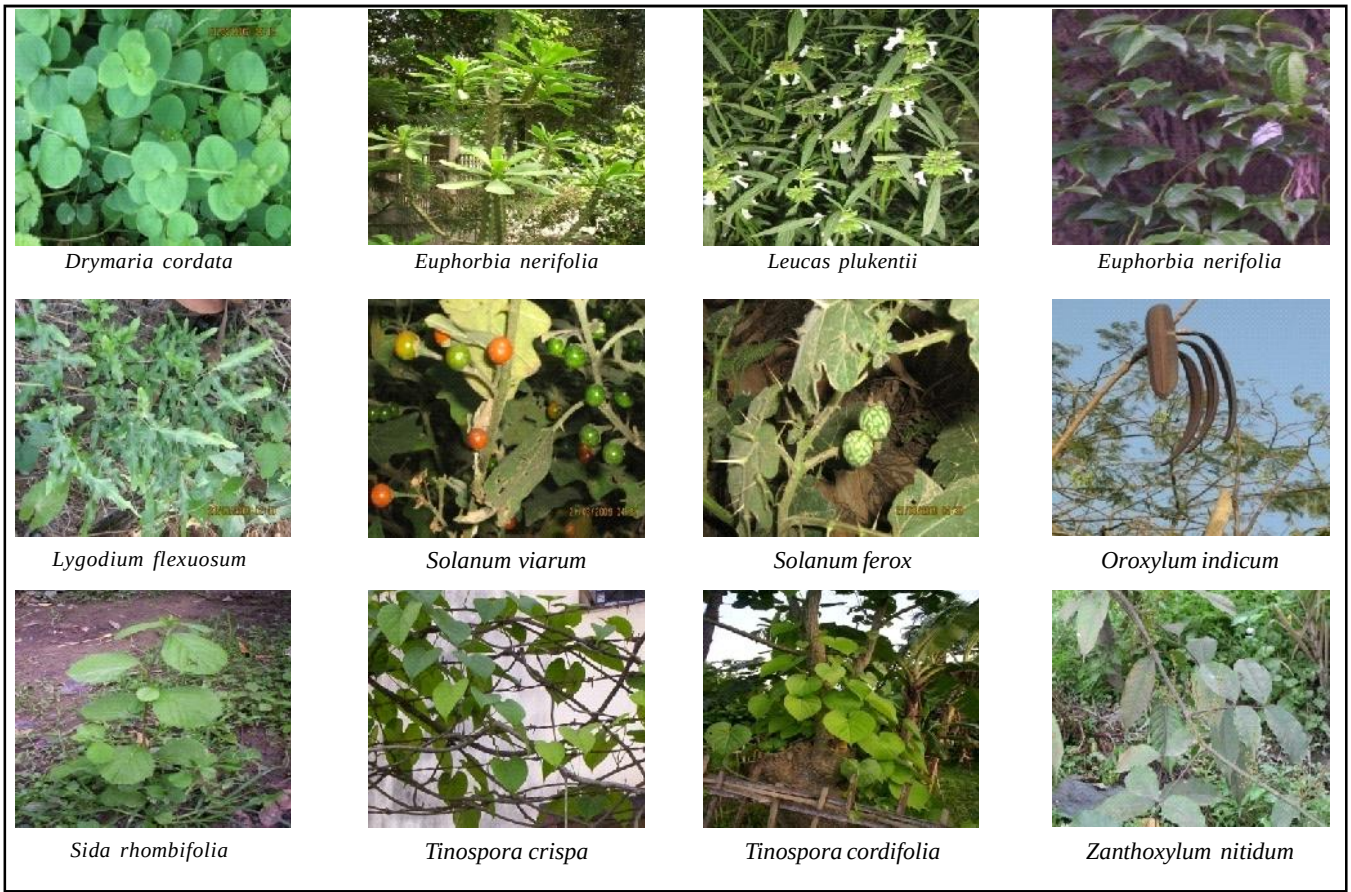

Fig. 1 : Few recorded plants used for hepatitis and influenza treatments in Sivasagar district

Table 1: Enumeration of the recorded ethno-medicinal plants with their botanical name, family, local name, habits and relative abundance, part and products used for hepatitis and influenza treatments

Sr. No.	Botanical name, family and Assamese name of the plants	Parts and products used in ethno-medicinal supplements		Parts and products used in therapeutic drugs	
		Hepatitis	Influenza	Hepatitis	Influenza
1.	*Acorus calamus* L. Family-Araceae Assamese Name- Bosh Habits- H Relative abundance- C, N&Cu	Not used	Not used	Stolon	Stolon
2.	*Allium sativum* L. Family- Alliaceae Assamese Name- Naharu Habits- H Relative abundance- C, Cu	Bulb	Bulb	Bulb	Bulb
3.	*Alstonia scholaris* (L.) R. Br. Family-Apocynaceae Assamese Name- Chitiana Habits- T Relative abundance- C, N	Not used	Not used	Bark	Bark
4.	*Caesalipinia bonduc (L). Roxb.* (= *Guilandiana bonduc* L.) (=*C.Crispa* L.) Family – Caesalpiniaceae Assamese Name- Leta Guti Habits- Sh Relative abundance- Th, N	Not used	Not used	Leaves, Inner part of the seed	*Inner parts of the seed
5.	*Citus aurantifolia* (Chirsten) Swing. Family-Rutaceae Assamese Name- Kajinemu Habits- Sh Relative abundance- C, Cu.	Fruit	Fruit	Bark of stem	Fruit
6.	*Drymaria cordata* (L).Willd.exR.& S. Family- Carryophyllaceae Assamese Name- Laijabori Habits- H Relative abundance- C, N	Twigs	Twigs	Whole Plant	Whole Plant
7.	*Euphorbia nerifolia* L. Family- Euphorbiaceae Assamese Name- Hiju Habits- Sh, Relative abundance- C, N & Cu	Not used	Not used	Young leaves	*Young leaves
8.	*Hedyotis diffusa* Willd. Family- Rubiaceae Assamese Name- Bon Jaluk Habits- H Relative abundance- Th, N	Whole Plant	Whole Plant	Whole Plant	Whole Plant
9.	*Justicia adhartoda L.* (=*Adhartoda zeylancia* Medic.) Family-Acanthaceae Assamese Name- Boga Bahak Habits- Sh Relative abundance- Th , N & Cu	Not used	Not used	Leaves, and flower	Leaves, and flower
10.	*Lasia spinosa* Thw. Family-Araceae Assamese Name- Chengmora Habits- H Relative abundance- Th, N	Young Leaves	Young Leaves	Stem, modified root	Young Leaves

Table 1 contd….

Contd…. Table 1

11.	*Leucas plukentii* (Roth) Spreng. (= *L. aspere* Link.) Family-Lamiaceae Assamese Name- Durun Bon Habits- H Relative abundance- C, N	Young Plants	Young Plants	Twigs, roots	Young Plants
12.	*Lygodium flexuosum* L. Family-Lygodiaceae Assamese Name- Kapow Dhekia Habits- Cl Relative abundance- Th, N	Twigs	Twigs	Whole plant	Twigs
13.	*Nycanthes arbor-tristis* Linn. Family-Nycanthaceae Assamese Name- Durun Bon Habits- Sh.St Relative abundance- C, Cu	Leaves, Flowers	Leaves, Flowers	Bark, Leaves, flowers	Leaves, and Flowers
14.	*Ocimum tenuiflorum* L. Family-Lamiaceae Assamese Name- Kola Tulokhi Habits- H Relative abundance- C, Cu	Leaves	Leaves	Leaves, Seeds	Leaves, Seeds
15.	*Oroxylum indicum* (L.) Vent. Family- Bigoniaceae Assamese Name- Bhat Ghila Habits- St Relative abundance- Th , N	Not used	Not used	Bark	Flowers
16.	*Phlogocanthus thrysiformis* Hardw. Mabberley (=*P. thrysiflorus* (Roxb.) Nees.) Family-Acanthaceae Assamese Name- Tita Phul Habits- Sh Relative abundance- Th , N & Cu	Young Leaves, Flowers	Young Leaves, Flowers	Leaves, and flowers	Young Leaves, and Flowers
17.	*Piper longum*.L Family – Piperaceae. Assamese Name- Pipoli Habits- Cl Relative abundance- Th , N	Fruits	Fruits	Fruits	Fruits
18.	*Piper nigrum* L. Family- Piperaceae. Assamese Name- Jaluk Habits- Cl Relative abundance- Th , Cu	Seed	Seed	Seed	Seed
19.	*Sapindus mukorossii* Gaertn. (= *S. trifoliatus* L.) (= *S. emarginatus* Vahl.) Family- Sapindaceae. Assamese Name- Monisal Habits- St Relative abundance- Th , N	Not used	Not used	Bark, Inner part of the seed	*Inner part of the seed
20.	*Sida rhombifolia* L. Family- Malvaceae Assamese Name- Saru Sunborial Habits-H Relative abundance- C, N	Not used	Not used	Roots	*Roots

Table 1 contd…

Contd…. Table 1

21.	*Solanum ferox* L. Family –Solanaceae Assamese Name- Kotana Bangana Habits-H Relative abundance- Th, N	Not used	Not used	Young Leaves, roots, fruits	*Fruits
22.	*Solanum viarum* Dunal (=*S. khasianam* Cl.) (=*S.myriacanthum* Dunal.) Family – Solanaceae Assamese Name- Tita Bhekuri Habits - Sh Relative abundance-Th, N& Cu	Raw Fruits	Raw Fruits	Young leaves, roots, fruits	Raw Fruits
23.	*Tinospora cordifolia* (Willd) Hook.f.Th. Family- Menispermaceae Assamese Name- Siddhi Lota Habits- Cl Relative abundances-Th, N& Cu	Young Leaves	Young Leaves	Leaves, Steam	Leaves
24.	*Tinospora crispa* (L.) Hook. f.Th. Family- Menispermaceae Assamese Name- Soguni Lota Habits-Cl Relative abundance-Th, N& Cu	Young Leaves	Young Leaves	Leaves, Steam,	Leaves
25.	*Zanthoxylum nitidum* (Roxb.) DC. (=*Z. Hamiltonianum* Wall.) Family- Rutaceae Assamese Name- Tezmuri Habits- Sh Relative abundance-Th, N	Not used	Not used	Bark, roots	*Bark
26.	*Zigiber officinal* Rose. Family- Zingiberaceae Assamese Name- Moran Adda Habits- H Relative abundance- Th, Cu	Rhizome	Rhizome	Rhizome	Rhizome

(H-Herbs, Sh-Shrub, Cl-Climber, St.Sh-Straggling Shrub, St-Small Tree, T-Tree, C-Common, Th- Threatened, N-Naturally grown, Cu- Cultivated)
Source: Based on primary data (2008-2009).

(=*S.myriacanthum* Dunal.) and *Zanthoxylum nitidum* (Roxb.) DC. (=*Z. Hamiltonianum* Wall.). Practitioners generally use one or two plants parts and products in their drug dose along with Ocimum *tenuiflorum* L. (= *O. sanctum* L.), and *Zingiber officinale* Roxb *Allium sativum* L., *Piper longum*.L. and *Piper nigrum* L. (Table 1 and Fig. 1).

Plants used as medicinal supplement forms:

During hepatitis and influenza, parts and products of 16 species used as medicinal supplements. The species are *viz.*, *Allium sativum* L., *Citus aurantifolia* (Chirsten) Swing. *Drymaria cordata* (L). Willd.ex R. & S., *Hedyotis diffusa* Willd, *Lasia spinosa* Thw, *Leucas plukentii* (Roth). Spreng. (= *L. aspere* Link.), *Lygodium flexuosum* L., *Nyctanthus arbotristis* L., *Ocimum tenuiflorum* L. (= *O. sanctum* L.), *Phlogocanthus thrysiformis* Hardw. Mabberley. *Piper longum*.L. *Piper nigrum* L. *Solanum viarum* Dunal. (=*S. khasianam* Cl.) (=*S. myriacanthum* Dunal.), *Tinospora crispa* (L.) Hook. f.Th., *Tinospora crispa* (L.) Hook.f.Th and *Zingiber officinale* Roxb (Table 1).

Raw drugs formulation methods and techniques:

During field observation it was found that all respondents collected the raw parts and products of the plants from their homeland garden "Bari" and nearby village forest for therapeutic drug and supplement formulation. Ethno-medicine practitioners and experience users followed some basic ethno-medicinal norms during raw plants and their parts collection. Reputed practitioners formulated therapeutic drug doses at certain standardized forms for various age-groups. Raw therapeutic drugs formulation methods and techniques are varying from practitioners to practitioners for which such raw drugs are not always effective. Again therapeutic value of raw parts of plants is varying from season to season and time to time. Reputed ethno-medicine practitioners have vast knowledge on medicinal plants and their parts use, for which

Table 2 : Market price and seasonal availability of few reported plants

Sr. No.	Botanical name, Family and Local name of the plant	Parts and products sale in local market	Average price in market (Rs.)		Seasonal availability
			Rural market	Urban Market	
1.	*Allium sativum* L. Family- Alliaceae Assamese Name- Naharu	Cloves	70/- per kg	70/- per kg	All seasons
2.	*Caesalipinia bonduc* (L). Roxb. (= Guilandiana bonduc L.) (=C.Crispa L.) Family – Caesalpiniaceae Assamese Name- Leta Guti	Seeds	Price of raw seeds 1/- for one seed	Price of raw seeds Rs.1/- for one seed	Raw seeds in March-April. and dry seeds in all seasons.
3.	*Citus aurantifolia* (Chirsten) Swing. Family-Rutaceae Assamese Name- Kajinemu	Fruits	1/-per fruit	1/-per fruit	All seasons
4.	*Hedyotis diffusa* Willd. Family- Rubiaceae Assamese Name- Bon Jaluk	Whole plants	100gm 15/-	100gm 20/-	Dec. to May.
5.	*Lasia spinosa* Thw. Family-Araceae Assamese Name- Chengmora	Young leaves	100gm 05/-	100gm 10/-	Summer
6.	*Leucas plukentii* (Roth) Spreng. (= L. aspera Link.) Family-Lamiaceae Assamese Name- Durun Bon	Young leaves	100gm 15/-	100gm 15/-	Winter
7.	*Nycanthes arbor-tristis* Linn. Family-Nycanthaceae Assamese Name- Shewali	Flowers	20/-per100gm	30/- per100gm	Sept.-Oct.
8.	*Phlogocanthus thrysiformis* Hardw. Mabberley (=*P. thrysiflorus* (Roxb.) Nees.) Family-Acanthaceae Assamese Name- Tita Phul	Flowers	10/- per100gm	15/- per100gm	March.-April.
9.	*Piper longum* L Family – Piperaceae. Assamese Name- Pipoli	Fruits	Raw fruits 20/- per 100gm.	Dry fruits 50/-per 100gm.	Raw fruits J an.-April.Dry Fruits in all seasons
10.	*Piper nigrum* L. Family- Piperaceae. Assamese Name- Jaluk	Seeds	Raw Seeds 15/-per 100g.	20/- per100g	Winter
11.	*Sapindus mukorossii* Gaertn. (= *S. trifoliatus* L.) (= *S. emarginatus* Vahl.) Family- Sapindaceae. Assamese Name- Monisal	Seeds	20/-per kg	50/-per kg	Winter
12.	*Solanum viarum* Dunal (=*S. khasianam* Cl.) (=*S.myriacanthum* Dunal.) Family – Solanaceae Assamese Name- Tita Bhekuri	Fruits	100/- per kg.	120/- per kg	Dec.-August.
13.	*Zigiber officinal* Rose. Family:- Zingiberaceae Assamese Name- Moran Adda	Rhizome	Raw rhizome 80/-per kg	Dry, 200/-per kg	All seasons

Source: Based on primary data, (2008-2009).

they used different plants in different seasons in their drug doses. It is again observed that most of the practitioners generally used seasonally available edible plants which have very less adverse effect on health.

Administration of any ethno-medicinal drugs is very much risky. During ailments treatments practitioners carefully apply their raw drug doses especially in case of pregnant women and child. It is observed that raw drug dosages are always formulated along with few edible plant parts. Most of the raw preparations are formulated as liquid dosage forms. Local people generally use raw drugs when with aliphatic treatment. Ethno-medicinal drugs have strong social reliability in the district for its effectiveness and less adverse effects on health. During influenza and hepatitis infection practitioners uses the reported plants but their formulation are different. Again 16 reported plants are used by all communities and tribes as medicinal recipe forms during hepatitis and influenza. Generally family head and experience women are well experience in species collection for recipes. Communities and tribes have strong knowledge base on edible hepato-protective and flu protective plants.

Reputed practitioners are locally known as *Bee, Beezoni* and *Ozza* have separate social status in the district. Most of the ethno-medicine practitioners performed their health care services in humanitarian ground. With the advancement of medical science and changing health care utilization behaviors of rural people of the district, ethno-medicine practices have been losing its attention within the district. Still rural females are well experienced in medicinal plants selection for medicinal recipe preparation.

Medicinal plant population of the district is under threat for several anthropogenic and ecological factors *viz.*, habitat loss of species for changing patterns of agricultural and residential land-use, changing traditional food habits and life style for globalization, lack of knowledge on medicinal value of the species and their economic prospect, popularity of allopathic system of medicine for scientific practices, losing faith on ethno-medicinal drugs, extension and development of small scale tea cultivation in the high land, lack of integrated research and developmental works on ethno medicinal health care sector and lack of need base plans of government for sustainable utilization and management of medicinal plants, for which the hot spot area has been silently converted in to a warm spot area. Increasing demand of effective anti-hepatitis and anti-flu herbal drugs and medicinal supplements in the world, a need based plan is utmost necessary for sustainable economic utilization of the plants with proper clinical trials and pharmacological tests.

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