A Study on Ethnobotanically Important Plant Species Used against Various Gastro-Intestinal (GI) Disorders by the Indigenous People of Barpeta District of Assam, North-East India

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Received September 30, 2020; Revised November 7, 2020; Accepted November 29, 2020

Cite This Paper in the following Citation Styles

(a): [1] Jyotirmoy Thakuria, Manalisha Deka, Bijita Podder, "A Study on Ethnobotanically Important Plant Species Used against Various Gastro-Intestinal (GI) Disorders by the Indigenous People of Barpeta District of Assam, North-East India," Advances in Zoology and Botany, Vol. 8, No. 6, pp. 512 - 520, 2020. DOI: 10.13189/azb.2020.080605.

(b): Jyotirmoy Thakuria, Manalisha Deka, Bijita Podder (2020). A Study on Ethnobotanically Important Plant Species Used against Various Gastro-Intestinal (GI) Disorders by the Indigenous People of Barpeta District of Assam, North-East India. Advances in Zoology and Botany, 8(6), 512 - 520. DOI: 10.13189/azb.2020.080605.

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Abstract Plants and plant products have been used in traditional medication system to treat several human diseases since long back. The North-eastern region of India is a part of foot hills of Himalayas and Indo-Burma biodiversity hot spot and it was proved to be a home for a large number of ethnoboanically important plant species by several researchers. The present study was carried out during July, 2018 to June, 2019 for a period of one year at Barpeta district of Assam, North-East India to prepare a database on traditional knowledge of indigenous people regarding the uses of different plants to cure various Gastro-Intestinal (GI) disorders. The district is situated at a global position between 26°45′-26°50 N latitude and 90°30′-91°51′0″E longitude. Extensive field studies were conducted in the study area to obtain firsthand information on uses of ethnobotanically important plants. Sample specimens were collected and preserved during the study period. This report has documented 55 number of plant species belonging to 38 families used by the local people and especially by the traditional drug practitioners of the study area against various GI anomalies. In spite of the availability and accessibility of the modern system of medication, most of the people of the study area still depend on herbal medication system provided by traditional drug practitioners to treat a range of GI anomalies. This documentation will help to harness this traditional knowledge and to preserve this knowledge for the betterment of future mankind.

Keywords Ethnobotany, Gastro-Intestinal (GI) Disorders, Traditional Medication

1. Introduction

Plants and plant products have been used as medicine to treat several human diseases since long ago. In a country like India, the traditionally used medication system plays an important role in health care of rural people. About 45000 number of plant species were recorded and identified in India and out of which more than 35000 plant species have been claimed to possess medicinal properties [1]. According to World Health Organization, about 80% of the World’s population especially the tribal and rural dwelling population depends on herbal medications for their primary health care needs [2].

The North-eastern region of India is a part of foot hills
of Himalayas and Indo-Burma biodiversity hot spot and it comprises about 50% of India’s total biodiversity [3]. Several researchers have studied about the ethnobotanically important plant species of this region at different times [4-7]. Assam is one of the evergreen states of North-East India and more than 200 medicinally important plant species were reported from this state [8].

Gastro-intestinal (GI) disorders are those which are associated with the gastro-intestinal tract and its associated glands viz., liver, pancreas etc. Diseases like dysentery, diarrhea, constipation, indigestion, stomach ache, stomach ulcer, worm infestation in children, piles, acidity or gastric trouble, Jaundice etc. are considered as GI disorders. The primary objective of the present study was to prepare a database on indigenous knowledge on medicinal plants used for curing various Gastro-Intestinal ailments of human beings among local people of Barpeta district of Assam, North-East India.

2. Materials and Methods

2.1. Study Area

The present study was carried out at Barpeta district of Assam, North-East India (Fig.1). The district is situated at a global position between 26°45′-26°50′ N’ latitude and 90°30′-91°51′0″E longitude. Barpeta district of Assam is bounded by Nalbari district to the East, Bongaigaon & Chirang district to the West, Baska district to the North and Goalpara & Kamrup district to the South. The district headquarter, Barpeta town is located at a distance of about 105km from the state capital, Guwahati city. The district covers an area of 2645 sq. km with a total population of 1693622 (2011 census) and is having a total of 850 revenue villages [9]. The climatic condition of the area is subtropical with an annual average rainfall of 200-300 cm. This area is very rich in floral bio resources [10].

![Map of the Study Area](image)
2.2. Conduction of Survey, Sample Collection and Identification

An extensive field study was carried out among the local people of the study area for a period of one year from July, 2018 to June, 2019. Simple random sampling method was adopted to conduct the survey. Basically, local traditional drug practitioners (locally known as Kabiraj or Bez) along with elderly people of age ranges between 40-90 years were interviewed for first-hand information regarding the use of different plants, mode of drug preparation and dosage composition which they use to cure Gastro-Intestinal anomalies. A total of 45 numbers of traditional drug practitioners (Kabiraj or Bez) were interviewed during the survey period.

The sample collection was done at the study sites by following standard protocol for plant collection. For collection of plant samples, study area was visited along with the respective Kabiraj or Bez from whom the information was recorded. Plant samples were collected in the flowering state and were kept in care. Collected plant samples were further processed and preserved following the routine protocol of standard herbarium preparation. Identification of the collected specimens were done with the help of pertinent floras [11-13] as well as with the help of taxonomic expert and confirmed with the authentic specimens present at the Botany Department, Gauhati University and Botanical Survey of India, Eastern Circle, Shillong, Meghalaya, India.

3. Result

A total 55 number of plants belonging to 38 families which are used to cure GI disorders were recorded and identified during the study. The descriptions of the plants have been depicted in table 1. Mode of preparation of drugs and their application against different GI disorders have been described in table 2. Figure 2 has depicted the distribution of the plants recorded during the study according to their habit. Different parts of the plants are used against different GI disorders as depicted in figure 3. Numbers of different plants used against different GI disorders has been depicted in figure 4.

Table 1. Descriptions of the plants identified during the study

| Sl. No. | Scientific name | Vernacular name | Family       | Type   | Parts used |
|---------|-----------------|-----------------|--------------|--------|------------|
| 1       | Aegle marmelos (L.) Corr. | Bel             | Rutaceae    | Tree   | Fruit      |
| 2       | Alocasia indica (Roxb.) Schott | Man-kochu     | Araceae     | Herb   | Corm       |
| 3       | Allium sativum L. | Naharu          | Liliaceae   | Herb   | Bulb       |
| 4       | Aloe vera (L.) Burm. f | Salkonwari     | Liliaceae   | Herb   | Leaf       |
| 5       | Amaranthus spinosus L. | Kata-Khutara   | Amaranthaceae | Herb   | Whole plant |
| 6       | Averrhoa carambola L. | Kardoitenga    | Oxalidaceae | Tree   | Fruit      |
| 7       | Azadirachta indica A. Juss. | Mahanim     | Meliaceae   | Tree   | Leaf       |
| 8       | Boerhavia diffusa L. | Purnounouwa   | Nyctaginaceae | Herb   | Leaf and stem |
| 9       | Calotropis gigantea (L.) R. Br | Aakan         | Asclepiadaceae | Tree   | Leaf       |
| 10      | Camellia sinensis L. kuntze | Chapat       | Theaceae    | Tree   | Leaf       |
| 11      | Centella asiatica L. | Manimuni      | Apiaceae    | Herb   | Whole plant |
| 12      | Coriandrum sativum L. | Dhaniya        | Apiaceae    | Herb   | Whole plant |
| 13      | Costus speciosus (Koen. ex Retz.) Smith | Jamlakhuti | Costaceae   | Herb   | Rhizome    |
| 14      | Curcuma longa L. | Haladhi        | Zingiberaceae | Herb   | Rhizome    |
| 15      | Carica papaya L. | Amita                  | Caricaceae  | Tree   | Fruit      |
| 16      | Citrus limon (L.) Osbeck | Nemutenga    | Rutaceae    | Tree   | Fruit      |
| 17      | Dillenia indica L. | Outenga        | Dillaniaceae | Tree   | Fruit      |
| 18      | Eclipta prostrate L. | Kehraj-bon    | Asteraceae  | Herb   | Leaf       |
| 19      | Garcinia cowa Roxb. ex DC. | Kiji-thekera | Clusiaceae  | Tree   | Fruit      |
| 20      | Garcinia pedunculata Roxb. | Bor-thekera  | Clusiaceae  | Tree   | Fruit      |
| 21      | Houttuynia cordata Thunb. | Machenderi   | Saururaceae | Herb   | Leaf       |
| 22      | Hydrocotyle sibthorpioides L. | Saru-manimuni | Apiaceae | Herb   | Whole plant |
| 23      | Hyptis suaveolens (L.) Poit. | Tokmah       | Lamiaceae   | Shrub   | Seeds      |
| 24      | Ipomea mauritiana Jacq. | Bhui-komora   | Convolvulaceae | Climber | Rhizome    |
| 25      | Justicia adhatoda L. | Bahakatita    | Acanthaceae | Shrub   | Leaf       |
Table 1 Continuous

| No. | Species Name                  | Habit            | Family    | Part(s)                  |
|-----|------------------------------|------------------|-----------|--------------------------|
| 26  | *Leea asiatica* (L.) Rid.    | Aha bon          | Liaceae   | Herb                     |
| 27  | *Leucas aspera* (Willd.) Link| Doron-bon        | Lamiaceae | Herb                     |
| 28  | *Mentha spicata* L.          | Pudinah          | Lamiaceae | Herb                     |
| 29  | *Machilus bombycina* King ex Hook. F. | Chorn         | Lauraceae | Tree                     |
| 30  | *Marsilea minuta* L.         | Pani-tengechi    | Marsileaceae | Herb                  |
| 31  | *Meyna spinosa* Roxb. ex Link. | Moin           | Rubiaceae | Tree                     |
| 32  | *Momordica charantia* L.     | Titakerela       | Cucurbitaceae | Climber            |
| 33  | *Moringa oleifera* Lam.      | Sajina           | Moringaceae | Tree, leaf, flower and fruit |
| 34  | *Murraya koenigii* L. Sprengel | Narasingha    | Rutaceae  | Shrub                    |
| 35  | *Musa paradisiaca* L.        | Bhimkol          | Musaceae  | Body, Fruit              |
| 36  | *Musa sapientum* L.          | Kachkol/Pura kol | Musaceae  | Shrub                    |
| 37  | *Oxalis corniculata* L.      | Tengsitengapa    | Oxalidaceae | Herb                  |
| 38  | *Ocimum sanctum* L.          | Tuli             | Lamiaceae | Shrub, Leaf              |
| 39  | *Paderia scendens* (Lour.) Merr. | Bhedailota     | Rubiaceae | Climber                  |
| 40  | *Piper nigrum* L.            | Jaluk            | Piperaceae | Climber                  |
| 41  | *Psidium guajava* L.         | Madhuriaam       | Myrtaceae | Tree                     |
| 42  | *Phyllanthus emblica* L.     | Amlokhi          | Phyllanthaceae | Tree                  |
| 43  | *Punica granatum* L.         | Dalim            | Lythraceae | Shrub, Fruit and leaf    |
| 44  | *Solanum torvum* Sw.         | Tita-bhekuri     | Solanaceae | Shrub                    |
| 45  | *Solanum lycopersicum* L.    | Saru-titabhekuri | Solanaceae | Shrub                    |
| 46  | *Spondias pinnata* (L. f.) Kurz | Bilahi         | Solanaceae | Shrub                    |
| 47  | *Swertia chirayita* (Roxb. Ex Fleming) | Chirata       | Gentianaceae | Tree, Leaf and stem |
| 48  | *Syzygium cumini* (L.) Skeels | Kala-jamu       | Myrtaceae | Tree, Fruit and bark     |
| 49  | *Terminalia bellerica* (Gaertn.) Roxb | Bhomora       | Combretaceae | Tree                   |
| 50  | *Terminalia chebula* Retz.   | Hilikha          | Combretaceae | Tree                   |
| 51  | *Vetiver regnum* L.          | Posotiya         | Verbenaceae | Shrub                    |
| 52  | *Vigna mungo* (L.) Hepper    | Matimah          | Fabaceae  | Herb                     |
| 53  | *Vitex peduncularis* Wall.   | Ahoi             | Verbenaceae | Herb                    |
| 54  | *Zinziber officinalis* Roscoe | Ada              | Zingiberaceae | Herb                  |

Figure 2. Distribution of plants according to their habit
**Figure 3.** Different parts of plants used against different GI disorders

**Table 2.** Mode of preparation and dosage composition

| Name of the plant | Used against | Mode of preparation and dosage composition |
|-------------------|--------------|---------------------------------------------|
| *Aegle marmelos* (L.) Corr. | Constipation | Ripe fruit is taken orally. |
| *Alocasia indica* (Roxb.) Schott | Jaundice, Liver disorder | Boiled or cooked corn is taken orally with boiled rice. |
| *Allium sativum* L. | Indigestion | 2 or 3 pieces of bulb are taken orally with a glass of cold water. |
| *Aloe vera* (L.) Burm.f | Acidity | One glass of leaf juice is taken orally once daily for 5-7 days. |
| *Amaranthus spinosus* L. | Jaundice, Diarrhoea | Cooked or boiled plants are taken orally. |
| *Averrhoa carambola* L. | Jaundice, Dysentery | Cooked fruit is taken orally with boiled rice. |
| *Azadirachta indica* Juss. | Worm infestation | 1-2 tea-spoon of leaf decoction is taken orally twice a day for a period of 7-10 days. Sometimes, fresh leaf juice is also taken for effective result. |
| *Boerhavia diffusa* L. | Indigestion, Jaundice, Dysentery | Boiled or cooked leaves and stems are taken orally. |
| *Calotropis gigantea* (L.) R. Br | Piles | 3-4 leaves are crushed and the juice obtained is taken orally twice daily for one month. |
| *Camellia sinensis* L. kuntze | Dysentery | Leaf decoction is taken orally. |
| *Centella asiatica* L. | Dysentery, Diarrhoea, Bowl trouble | Whole plant is grinded into paste or cooked and taken orally. |
| *Coriandrum sativum* L. | Indigestion | A paste is made by grinding the fresh plant and is taken orally with boiled rice. |
| *Costus speciosus* (Koen. Ex Retz.) Smith | Diabetes, Jaundice | Rhizome is grinded into paste and taken orally by diabetic patient. |
| *Curcuma longa* L. | Dysentery, Abdominal ache | Rhizome is grinded into paste and taken orally with or without honey. |
| *Carica papaya* L. | Constipation, Acidity | Ripe fruit is useful against constipation. |
| *Citrus limon* (L.) Osbeck | Acidity | Boiled or cooked fruit is taken orally with boiled rice for almost one month twice daily to get rid of acidity. |
| *Dillenia indica* L. | Diarrhoea, Bowl trouble | Cooked fruit is taken orally with boiled rice. |
| Plant Name                          | Condition               | Treatment                                                                 |
|------------------------------------|-------------------------|---------------------------------------------------------------------------|
| *Eclipta prostrata* L.             | Jaundice Acidity        | Leaves are grinded to paste and juice is taken orally                     |
| *Garcinia cowa* Roxb. Ex DC.       | Dysentery Digestive disorder | Ripe fruits are cut into slices and sun dried. 3-4 such slices are dipped into a glass of cold water and kept it overnight. This water is then taken orally. |
| *Garcinia pedunculata* Roxb.       | Dysentery Digestive disorder Jaundice | Ripe fruits are cut into slices and sun dried. 3-4 such slices are dipped into a glass of cold water and kept it overnight. This water is then taken orally. |
| *Houttuynia cordata* Thunb.        | Dysentery Diarrhea Bowl trouble | Fried leaves are taken orally with boiled rice. |
| *Hydrocotyle sibthorpioides* L.    | Bowl trouble            | Seeds are dipped in a glass of cold water and taken orally.               |
| *Ipomea mauritiana* Jacq.          | Liver disorder          | Rhizome is grinded into paste and taken orally for a week twice daily.    |
| *Justicia adhatoda* L.             | Jaundice Piles          | 3-4 leaves are crushed and the juice is taken orally twice daily for a period of 10-15 days for Jaundice and a month or 45 days to get cure from piles. |
| *Leea asiatica* (L.) Rid.          | Worm infestation Jaundice | Roots are grinded to paste and taken orally.                             |
| *Leucas aspera* (Willd.) Link      | Jaundice                | Cooked leaves and stems are taken orally.                                |
| *Mentha spicata* L.                | Acidity Bowl trouble    | Whole plants are grinded into paste and taken orally.                    |
| *Machilus bombycina* King ex Hook. F. | Piles                  | 3-4 leaves are crushed and juice is taken orally for almost one month twice daily. |
| *Marsilea minata* L.               | Worm infestation        | Cooked plants are taken orally.                                           |
| *Meyna spinosa* Roxb. Ex Link.     | Dyssenterary Bowl trouble Liver disorder | Leaves are crushed and juice is taken orally. |
| *Momordica charantia* L.           | Diabetes                | One glass of fruit juice is taken orally twice or thrice a week.          |
| *Moringa oleifera* Lam.            | Diabetes                | Cooked or fried fruits, flower and leaves are useful against diabetes.    |
| *Murraya koenigii* L. Sprengel     | Constipation Acidity Bowl trouble | Fresh leaves are made into paste and taken orally with boiled rice for 5-7 days. Sometimes, fried or cooked leaves are also taken to get rid of the problem. |
| *Musa paradisiaca* L.              | Dysentery Bowl trouble  | Ripe fruit is cut into slices and dipped into a glass of cold water and kept overnight and the water is taken orally. 2-3 tea-spoon of the juice from the lower body part of the plant is taken orally for a period of 3-5 days. |
| *Musa sapiantum* L.                | Dysentery               | Boiled fruit is taken orally with boiled rice.                            |
| *Oxalis corniculata* L.            | Bowl trouble            | Cooked plants are taken orally.                                           |
| *Ocimum sanctum* L.                | Dysentery               | 7-10 fresh leaves along with equal number of leaves of *Punica granatum* L. and *Psidium guajava* L. are crushed together and the juice obtained is taken orally twice or thrice a day until recovery. |
| *Paderia scendens* (Lour.) Merr.   | Dysentery Bowl trouble  | Cooked leaves and stems are taken orally with boiled rice.               |
| *Piper nigrum* L.                  | Indigestion             | Mature fruits are dried and grinded to powder. 1 tea-spoon of this powder with 1 tea-spoon of honey taken orally with a glass of lukewarm water. |
| *Psidium guajava* L.               | Dysentery               | 7-10 fresh leaves along with equal number of leaves of *Punica granatum* L. and *Ocimum sanctum* L. are crushed together and the juice obtained is taken orally twice or thrice a day until recovery. |
| *Phyllanthus emblica* L.           | Indigestion Acidity Bowl trouble Constipation Stomach ulcer | A powder is made from the dried fruits of this plant and mixed with the powder made from dried fruits of *Terminalia bellirica* and *Terminalia chebula*. This mixture is locally known as TRIFALA. 1-2 tea-spoon of TRIFALA is taken orally with or without a glass of water. Sometimes, 1 tea-spoon of Curcuma longa powder and 1 tea-spoon of honey are mixed with 1-2 tea-spoon of TRIFALA for effective result against indigestion, acidity and constipation and stomach ulcer. |
4. Discussion

The evergreen state of Assam was proved to be a home for a large number of ethnobotanically important plant species by several reports. 107 numbers of plants were recorded by Das et. al. [14] used by the tribal people of Cachar district of Assam against different human ailments. Hazarika et. al. [15] reported a total of 84 plant species belonging to 57 families used in medicinal purposes by the people of Assam and Manipur. A total of 85 plant species belonging to 49 families were recorded by Saikia et. al. [16] which are used by the Assamese people against
Several studies regarding the economically important plant species of Barpeta district of Assam were conducted by different researchers. According to a previous report, more than 750 plants species of economic importance have been recorded and identified from this region [10]. 57 plant species belonging to 36 families having medicinal value were identified and described by a study in the Manas National park situated near the study area [17].

The present study has documented the uses of 55 number of locally available plant species of the study area for treatment of various GI anomalies. It has been observed that most of the remedies consisted of single plant part and more than one method of preparation. Some of the remedies consist of different parts of the same plant to treat single or more diseases. However, in some cases, parts of two or even more different plants are used for curing a particular disease. For example, leaves of Ocimum sanctum L., Punica granatum L. and Psidium guajava L. are crushed together to make a paste and the juice obtained from that paste is used against Dysentery. TRIFALA prepared by the combination of fruits of three plants viz., Phyllanthus emblica L., Terminalia bellerica (Gaertn.) Roxb and Terminalia chebula Retz is extensively used against a range of GI anomalies.

5. Conclusion

The present investigation has explored some of the traditionally used medicinal plants to cure various GI disorders from Barpeta district of Assam, North-East India. But, the efficiency of using these traditional medications cannot be judge properly without proper scientific exploration, although the people of the study area are using these plants effectively from long back. In spite of the availability and accessibility of the modern system of medication, most of the people of the study area still depend on herbal medication system provided by traditional drug practitioners. The need of the hour is to harness this traditional knowledge and to preserve this knowledge for the betterment of future mankind.

Acknowledgement

Authors acknowledge the immense help of local people especially the local drug practitioners from the study area during the study. We also acknowledge the Botany Department, Gauhati University and Botanical Survey of India, Eastern Circle, Shillong, Meghalaya, India for the help during identification of the specimens collected during the study.

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