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The life-form characteristics of medicinal plants in the selected areas of Natore district, Bangladesh

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Abstract

The people of Lakhsmipur Kholabaria Union (Natore district), Bangladesh has been cultivating medicinal plants since last three decades and due to this, the area was selected purposively. The study was conducted to find out the life-form characteristics of medicinal plants those were being conserved by the people of the study area. Different participatory methods had been used to collect data from the field. It was found that the people of the area has been cultivating as many as 64 plants and more 21 plants were identified as wild but they kept close eye on those plants considering their economic potentials in near future. These plants were diversified among 45 families. This research examined their life-forms and compared those with Raunkiaer's one and found that the phanerophytes and therophytes were dominated species. This result indicated that the study area possessed dry, warmer wet climate with tolerable cold. This climate favours agricultural activities and also for growing plants. It was finally concluded that the area was suitable for the restoration of the locally maintained medicinal plants.

Keywords: Life-form, floristic composition, biological spectrum, medicinal plants, Bangladesh

INTRODUCTION

Life-form was said to represent the sum of adaptive characters in a species, and thus is an expression of the harmony between a plant and its environment (Warming, 1909). The species of higher plants of any community can be classified in one or more life-forms. The ratio of the life-forms of different species in terms of number or percentages in any floristic community is called the biological spectrum (Ambasht and Ambasht, 2002). The biological spectrum of vegetation is the index of the phytoclimate in a specific area. With changes of seasons, the appearance of vegetation changes. This is termed aspection and for this periodicity and phenology, the sociability or adaptability of plant community depends on (Singh and Ambasht, 1980; Ambasht, 1963). So the life-form, in turn, is the ultimate manifestation of the sum of all the adaptation under gone by plant to the environment in which it resides (Khan *et al.*, 2013; Cain *et al.*, 1959). Raunkiaer (1934) proposed a classification of flora on the basis of their life-forms. He also considered how different species overcome adverse conditions and human disturbance of a particular area. Thus it is a significant physiognomic feature that supposes to be the signal of micro and macro climate (Shimwell, 1971). On the other hand, disturbance on habitat can have an un-measureable outcome on life-form, phenology and distribution of plant population. Thus biotic influences like agricultural practices, grazing, etc. materially alter the biological spectrum of a community (Agarwal, 1989). So it would be uncritical comparison with normal world spectrum of a community may lead to misleading conclusion about the environment of that area (Ambust and Pandey, 1981; Bharucha and Ferreira, 1941). Literature dealing with the

life-form status shows scanty in Bangladesh. But some have done elsewhere (Khan *et al*., 2013; Malik *et al.*, 2007, Ewel and Bigelow, 1996, Solbrig, 1993; Rockwood, 1985). However if the life-form of a plant community would work-out at periodic intervals, it could set the guideline for eco-restoration and optimization of that community. In view of this, present study was undertaken at Natore district, Bangladesh. This is because the people of Lakhsmipur Kholabaria Union of this district have been cultivating and conserving some medicinal plants by using their local knowledge since last three decades. The present research argued that whether the existing phytoclimatic conditions of the study area was suitable for the conservation of medicinal plants or not and the main focus of the study was to find out the life-form characteristics of those plants which could ultimately lead the ecological restoration of the plants in the study area.

MATERIALS AND METHODS

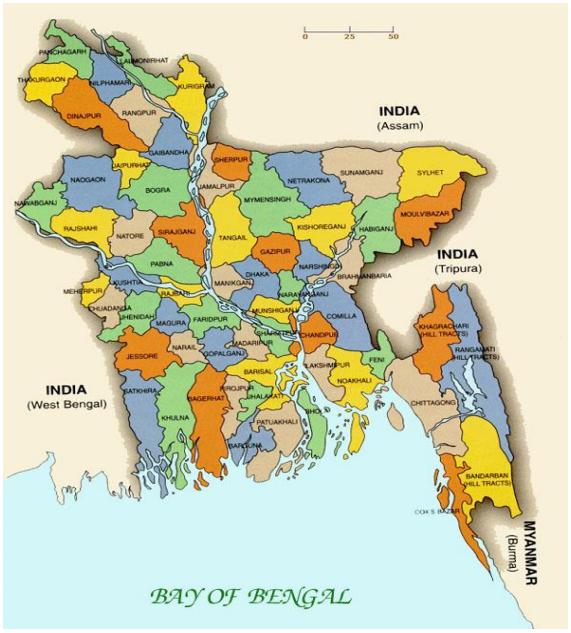
The study area is situated within the Gangetic floodplain and it had been purposively selected for this research. It stands at 24^0 22′ Northern latitude and 89^0 02′ East longitude (Figure 1). The climate of this area is generally sub-tropical, characterized by short winter and long dry season with high temperature, heavy monsoon rain and high humidity. On the basis of the feature of inundation of flood water, there were four major types of land. The high land (20%) never inundated by flood water, medium high land (35%) submerged by flood water for a short time, the medium low land (30%) inundated by rain or flood water for 4/5 months and the low land (15%) inundated about 8/9 months around the year (Table 1).

Table 1: Types of land with their inundation levels at the study area

Land types	Normal inundation levels (cm)	Percentages of land
High land	Not inundated	20
Medium high land	<90	35
Medium low land	90-180	30
Low land	>180	15

Sources: Modified after Brammer, (1994).

As the people of the study area had been managing medicinal plants since last three decades, the researchers put their concentration about the ongoing process and the practices since 2004. As a result, participatory observation, case studies, structured and semi-structured interviews, group discussion were made (Chambers, 1999). Seasonal calendars of the flora were maintained for getting overall physiognomic characters of the available medicinal plants in that area (Given and Harris, 1994). The identification of plants was achieved with the help of taxonomic expert and by comparison with available literatures (Ghani, 2003; Prain, 1963; Huq, 1986).



RESULTS AND DISCUSSION

From the research site 85 medicinal plants were documented and those possessed different habits and life-forms. Among those 42 species (49%) were cultivated, 22 species (26%) were found as semi-cultivated and 21 species (25%) were found as wild (Figure 2). These 85 plant species comprising 40 spp. were herbs (47%), 15 spp. were shrubs (18%), 18 spp. were trees (21%), and 12 spp. climbers (14%) which were belonging to 45 families (Figure 3). Among these most dominating family was Zingiberaceae with 6 members. The Crassulaceae contained 5 species. Caesalpinaceae, Apocyanaceae, Acantheceae, Solanaceae and Euphorbiaceae were represented by 4 species in each. On the other hand 27 families represented by single species (Figure 4). The biological spectrum of the above listed medicinal plants (85 spp.) showed that 38 spp. of them (45%) were phanerophytes, 26 spp (31%) were therophytes, 6 spp. (7%) were chamaephytes, 11 spp (13%) were cryptophytes and 4 spp. (4%) were hemicryptophytes (Figure 5).

Table - 2. Different types of flora and biological characteristics in the study area

Local name	Botanical name	Family	Habit	Existing nature of plants	Life-form
Lata-Kosturi	*Abelmoschus moschatus* (Linn.) Medik.	Malvaceae	Herb	Wild	Therophyte
Ulatkambal	*Abroma augusta* Linn.	Sterculiaceae	Shrub	Cultivated	Phanerophyte
Kunch	*Abrus precatorius* Linn.	Papilionaceae	Climber	Wild	Phanerophyte
Muktajhuri	*Acalypha indica* Linn.	Euphorbiaceae	Herb	Wild	Therophyte
Apang	*Achyranthes aspera* Linn.	Amarantheceae	Herb	Wild	Therophyte
Bel	*Aegle marmelos* (Linn.) Corr.	Rutaceae	Tree	Cultivated	Phanerophyte
Gritokumari	*Aloe barbadensis* Mill.	Liliaceae	Herb	Cultivated	Chamaephyte
Jangli-ada	*Alpinia nigra* (Gaertn). Burtt.	Zingiberaceae	Herb	Wild	Cryptophyte
Chatim	*Alstonia scholaris* (L.) R. Br.	Apocyanaceae	Tree	Semi-cultivated	Phanerophyte
Kantanotey	*Amaranthus spinosus* Linn.	Amarantheceae	Herb	Wild	Therophyte
Olkachu	*Amorphophallus campanulatus* (Roxb.)Bl. ex Decne.	Araceae	Herb	Semi-cultivated	Cryptophyte
Kalomegh	*Andrographis paniculata* Wall ex Nees.	Acantheceae	Herb	Cultivated	Therophyte
Shailkanta	*Argemone mexicana* Linn.	Papaveraceae	Herb	Wild	Therophyte
Ishwarmul	*Aristolochia indica* Linn	Aristolochiaceae	Climber	Cultivated	Phanerophyte
Satamuli	*Asperagus racemosus* Willd.	Liliaceae	Climber	Cultivated	Phanerophyte
Neem	*Azadirachta indica* A. Juss.	Meliaceae	Tree	Cultivated	Phanerophyte
Kalichandal	*Barleria prionitis* Linn.	Acantheceae	Herb	Semi-cultivated	Phanerophyte
Kanchan	*Bauhinia purpurea* Linn.	Caesalpiniaceae	Tree	Semi-cultivated	Phanerophyte
Latkan	*Bixa orellana* Linn.	Bixaceae	Tree	Cultivated	Phanerophyte
Punarnava	*Boerhaavia diffusa* Linn.	Nyctaginaceae	Herb	Semi-cultivated	Hemicryptophyte
Shimul	*Bombax ceiba* Linn.	Bombacaceae	Tree	Cultivated	Phanerophyte
Akando	*Calotropis gigantea* (Linn.) R. Br.	Asclepiadaceae	Shrub	Semi-cultivated	Phanerophyte
Karamcha	*Carissa congesta* wight.	Apocyanaceae	Tree	Cultivated	Phanerophyte
Nayantara	*Catharanthus roseus* (Linn.) G. Don.	Apocyanaceae	Herb	Cultivated	Therophyte
Thankuni	*Centella asiatica* (Linn.) Urbann.	Apiaceae	Herb	Wild	Chamaephyte
Tejpata	*Cinnamomum tamala* Nees.	Lauraceae	Tree	Cultivated	Phanerophyte
Hadjorha	*Cissus quadriangularis* Linn.	Vitaceae	Climber	Semi-cultivated	Phanerophyte
Telakucha	*Coccinea cordifolia* (L.) Cogn.	Cucurbitaceae	Climber	Wild	Phanerophyte
Bonchandal	*Codariocalyx motorius* (Hutt.) H. Onashi	Fabaceae	Shrub	Semi-cultivated	Phanerophyte
Keu-mul	*Costus speciosus* (Koenig.) Sm.	Zingiberaceae	Shrub	Wild	Cryptophyte
Talmul	*Curculigo orchioides* Gaertn.	Amaryllidaceae	Herb	Cultivated	Cryptophytes
Amada	*Curcuma amada* Roxb.	Zingiberaceae	Herb	Semi-cultivated	Cryptophyte
Halud	*Curcuma longa* Linn.	Zingiberaceae	Herb	Cultivated	Cryptophytes
Swarnalata	*Cuscuta relexa* Roxb.	Convolvulaceae	Climber	Wild	Phanerophyte
Foniraj	*Cycas rumpii* (Female) Miq.	Cycadaceae	Tree	Semi-cultivated	Phanerophyte
Moniraj	*Cycas rumpii* (Male) Miq.	Cycadaceae	Tree	Semi-cultivated	Phanerophyte
Mutha-ghas	*Cyperus rotundus* Linn.	Cyperaceae	Herb	Wild	Therophyte
Dhutra (Kalo)	*Datura metel* Linn.	Solanaceae	Herb	Semi-cultivated	Phanerophyte

Local name	Botanical name	Family	Habit	Existing nature of plants	Life-form
Dhutra (shada)	*Datura stramonium* Linn.	Solanaceae	Herb	Semi-Cultivated	Phanerophyte
Shonkomul	*Geodorum densiflorum* (*Lam.)Schltr*.	Orchidaceae	Herb	Cultivated	Cryptophyte
Bashak	*Justicia adhatoda Linn.*	Acantheceae	Shrub	Cultivated	Hemicryptophyte
Dadmordan	*Senna alata* (Linn.) Roxb.	Caesalpiniaceae	Shrub	Semi-cultivated	Phanerophyte
Kalkasunda	*Senna occidentalis Roxb*.	Caesalpiniaceae	Shrub	Semi-cultivated	Phanerophyte
Tarupchandal	*Desmodium motorium* (Houtt.) Merr.	Papilionaceae	Shrub	Cultivated	Therophyte
Nilkantho	*Ecbolium viridi* (Forsk.) Alst.	Acantheceae	Shrub	Cultivated	Phanerophyte
Kalokashi	*Eclipta alba* (L.) Hassak.	Asteraceae	Herb	Wild	Therophyte
Dudraj	*Euphorbia hirta* Linn.	Euphorbiaceae	Herb	Wild	Therophyte
Tejbal	*Euphorbia neriifolia* Linn.	Euphobiaceae	Shrub	Cultivated	Chamaephyte
Jogdumur	*Ficus racemosa* Linn.	Moraceae	Tree	Semi-cultivated	Phanerophyte
Hatisur	*Heliotropium indicum* Linn.	Boraginaceae	Herb	Wild	Therophyte
Anantamul	*Hemidesmus indicus* (L.) R. Br.	Periplocaceae	Climber	Semi-cultivated	Phanerophyte
Bhui-kumra	*Ipomoea paniculata* Radix	Convulvulaceae	Climber	Cultivated	Cryptophyte
Akangi	*Kaempferia galanga* Linn.	Zingiberaceae	Herb	Cultivated	Cryptophyte
Misridana	*Kaempferia rotunda* Linn.	Zingiberaceae	Herb	Cultivated	Cryptophyte
Rajkantho	*Kalanchoe daigremont* Perrier	Crassulaceae	Herb	Cultivated	Therophyte
Patharkuchi	*Kalanchoe pinnata* (Lam.) Pers.	Crassulaceae	Herb	Cultivated	Therophyte
Ranikantho	Kalanchoe sp.	Crassulaceae	Herb	Cultivated	Therophyte
Himsagor	*Kalanchoe spathulata* DC.	Crassulaceae	Shrub	Semi-cultivated	Therophyte
Mehedi	*Lawsonia inermis* Linn.	Lythraceae	Shrub	Cultivated	Phanerophyte
Hosto-karno-palash	*Leea macrophylla* Roxb.	Vitaceae	Shrub	Cultivated	Hemicryptophyte
Swetadrone	*Leucas aspera* (Willd.) Link.	Lamiaceae	Herb	Wild	Therophyte
Asamlata	*Mikania cordata* (Burm.) Roxb.	Asteraceae	Climber	Wild	Therophyte
Lajjabati	*Mimosa pudica* Linn.	Mimosaceae	Herb	Cultivated	Therophyte
Alkushi	*Mucuna pruriens* Baker.	Papilionaceae	Climber	Cultivated	Phanerophyte
Curulia	*Murdannia nudiflora* (L.) Brenan.	Commelinaceae	Herb	Semi-cultivated	Therophyte
Kalojira	*Nigella sativa* Linn.	Ranunculaceae	Herb	Cultivated	Therophyte
Kalo tulsi	*Ocimum americanum* Linn.	Lamiaceae	Herb	Cultivated	Therophyte
Tulshi	*Ocimum sanctum* Linn.	Lamiaceae	Herb	Cultivated	Therophytes
Amrul	*Oxalis corniculata* Linn.	Oxalidaceae	Herb	Semi-cultivated	Therophyte
Gandhovadali	*Paederia foetida* Linn.	Rubiaceae	Climber	Cultivated	Phanerophyte
Amloki	*Phyllanthus emblica* Linn	Euphorbiaceae	Tree	Semi-cultivated	Phanerophyte
Pipul	*Piper longum* Linn.	Piperaceae	Herb	Wild	Cryptophyte
Roktto chandal	*Pterocarpus santalinus* L.F.	Fabaceae	Shrub	Semi-cultivated	Phanerophyte
Sarpogandha	*Rauvolfia serpentina* (L.) Benth.	Apocyanaceae	Herb	Cultivated	Chamaephyte
Ashoke	*Saraca asoca* (Roxb.) De Wilde.	Caesalpiniaceae	Tree	Cultivated	Phanerophyte
Brela	*Sida cordifolia* Linn.	Malvaceae	Herb	Wild	Therophyte
Kumarilata	*Smilax zeylanica* Linn.	Liliaceae	Climber	Semi-cultivated	Phanerophyte
Tit-begun	*Solanum nigrum* Linn.	Solanaceae	Herb	Wild	Therophyte
Tatul	*Tamarindus indica* Linn.	Caesalpinaceae	Tree	Cultivated	Phanerophyte
Arjun	*Terminalia arjuna* (Roxb.) W.&A.	Combretaceae	Tree	Semi-cultivated	Phanerophyte
Bohera	*Terminalia bellirica* Linn.	Combretaceae	Tree	Semi-cultivated	Phanerophyte
Harotoki	*Terminalia chebula* (Gaertn.) Retz.	Combretaceae	Tree	Semi-cultivated	Phanerophyte
Nishinda	*Vitex negundo* Linn.	Verbenaceae	Tree	Semi-cultivated	Phenerophyte
Mohavingoraj	*Wedelia chinensis* (Osbeck.) Merr.	Asteraceae	Herb	Wild	Chamaephyte
Ashwagandha	*Whitania somnifera* Dunal	Solanaceae	Shrub	Cultivated	Therophyte

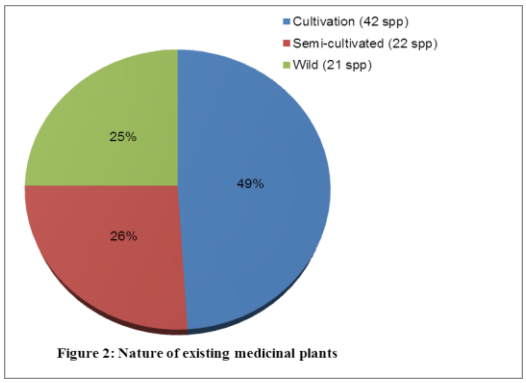


Figure 2: Nature of existing medicinal plants

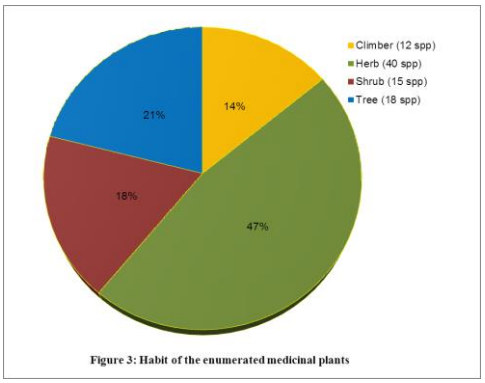
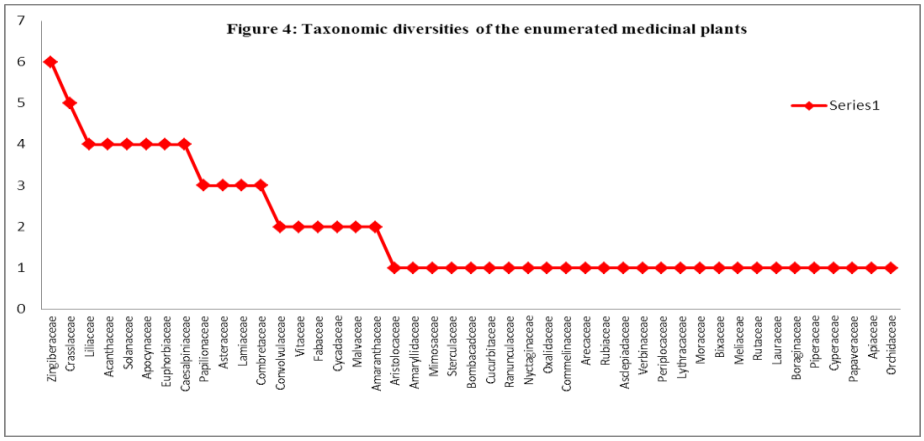


Figure 3: Habit of the enumerated medicinal plants



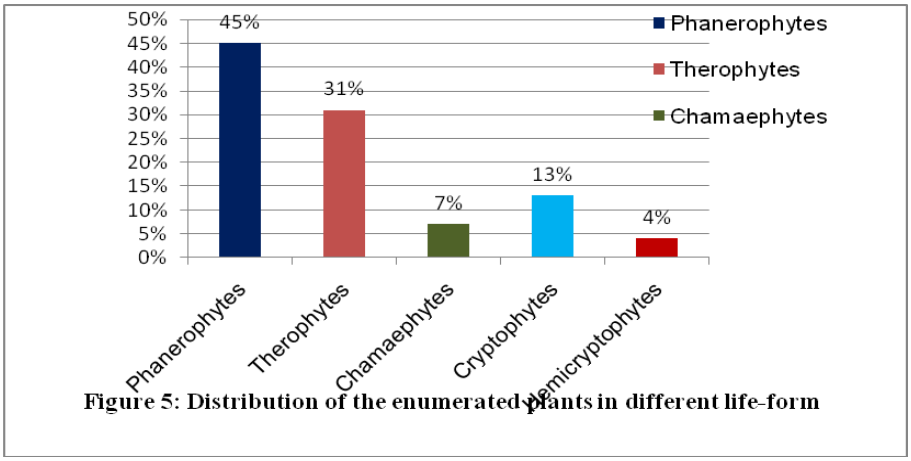


Figure 5: Distribution of the enumerated plants in different life-form

Generally the biological spectrum is worked out and compared it with Raunkiaer's one (Raunkiaer, 1934). In most of the spectra, there is one life-form whose percentage value is much higher than that of others. This indicates the predominance of a particular type of climate that favours the development of that life-form in higher proportion (Kahn, 1986; Ellenberg and Mueller, 1967). In our study, the dominance of phanerophytes and therophytes indicates about the tropical habitat. On the other hand less percentages of cryptophytes and hemicryptophytes, indicates little cold climate. From the above results it could reveal that the study area possessed dry, warmer wet climate with tolerable cold. However, the generalization of this postulation does not occur in real world where other ecological factors such as biotic disturbances remain there and act as per the needs of the existing biota. For example, the climate condition of the Gangetic plains is suited for forest development and therefore, phanerophytetes should be the dominant life-form (Ambasht, 1986). This study area remains under the

Gangetic floodplain where therophytes is also near to phanerophytes. Probably this is due to the biotic disturbace in the region. Frangi and Lugo (1985) studied the dynamic nature of sub-tropical forest ecosystem where they showed the accommodative capabilities of plants to adjust with ongoing processes (changes) in the ecosystem. Kaul (1965) also examined how medicinal plants accommodated themselves in different ecological conditions. Some people of the study area collected medicinal plants from other areas (mainly from forest land) and acclimatized them with the local environment and started cultivation to earn their subsistence. The study area is suitable for human settlement and their agricultural practices, grazing, scarping, etc. which could alter the biological spectrum. Nevertheless, as this region possesses dry, warmer, wet climate with shorter winter and agricultural practices have been occurring since long time ago. The people of this area have been managing medicinal plants through agricultural practices since last three decades. So the area is suitable for the restoration of selected medicinal plants by means of cultivation as well as through other management practices.

CONCLUSION

This research finally concludes that the phytoclimatic condition of the study area is suitable for the conservation of locally maintained medicinal plants.

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