

Diversity of Angiosperm Taxa in Chaar Khidirpur Area of Rajshahi, Bangladesh

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Abstract

Purpose: The aim is to investigate the angiosperm taxa in the study area. The present research also documented the species diversity and important medicinal plants.

Subjects and Methods: Angiosperm flora in the Chaar Khidirpur area of Rajshahi, Bangladesh was carried out from November 2018 to October 2019 to cover the seasonal variations. Plant parts with either flower or fruits collected using traditional herbarium techniques to make voucher specimens for documentation.

Results: The result focused that a total of 210 species belonging to 177 genera under 71 families were recorded. Forty-five (45) medicinal plants were used for the treatment of more than 61 diseases.

Conclusion: The present study was the first time to report angiosperm diversity and medicinal plants in the study area. In this research, the status of occurrence has been recorded for proper conservation management and sustainable utilization of the taxa resulting in 81.33% being common, 16.74% as rare and 1.91% are found as threatened in the study area.

1. Introduction

Angiosperms, approximately 300,000 species of flowering plants, the most important and maximum diverse group in the kingdom Plantae. Angiosperms represent about 80 percentages of all of the known green plants now living. The angiosperms are vascular seed flowers in which the ovule (egg) is sterilized and advanced right into a seed an enclosed hollow ovary. The ovary itself is commonly enclosed in a flower, that part of the angiospermous plant that incorporates the male or girl reproductive organs or both. Fruits are derived from the maturing floral organs of the angiospermous plant and rare therefore feature of angiosperms. The angiosperms dominate Earth's floor and vegetation in more environments, in particular terrestrial habitats than any other institution of flora. As a result, angiosperms are the maximum essential final source of meals for birds and mammals, which includes human. In addition, the flowering flowers are the most economically vital group of green plants, serving as a supply of pharmaceuticals, fibre products, timber, ornamentals and other commercial products (Ahmed *et al.*, 2008-2009). Important research work on angiospermic plants were carried out in Bangladesh by Rahman (2013), Rahman *et al.* (2007), Rahman *et al.* (2008), Rahman *et al.* (2015), Rahman and Keya (2014), Kona and Rahman (2014), Sultana and Rahman (2016), Sarker and Rahman (2016), Rahman (2017) and Sarker and Rahman (2019).

The present research was undertaken to record the diversity of angiosperms in Chaar Khidirpur area, Rajshahi, Bangladesh.

2. Methodology and Procedures

Study area

Chaar Khidirpur mouza is under Harian of Paba of Rajshahi district. Rajshahi is a metropolitan city, and a major urban, commercial and educational centre of Bangladesh. It is also the administrative seat of eponymous division and district. Located on the north bank of the Padma River, near the Bangladesh-India border, the city has a population of over 763,952 residents. The city is surrounded by the satellite towns of Nowhata and Katakhal, which together build an urban agglomeration of about 1 million populations. Arguably Rajshahi is the most clean and green among the cities in Bangladesh (BPC, 2001).

Research methodology

Diversity of angiospermic flora in Chaar Khidirpur area of Rajshahi, Bangladesh was carried out from November 2018 to October 2019. Plant parts with either flower or fruits collected using traditional herbarium techniques to make voucher specimens for documentation. Field identification of the collected specimens was confirmed comparing with herbarium specimens Rajshahi University Herbarium. In some cases, standard literature such as Hooker (1877), Prain (1903), and Ahmed *et al.* (2008-2009) were consulted for identification purpose. For update nomenclature Pasha and Uddin (2013) and Huq (1986) were also consulted. The specimens are deposited in the Herbarium, Department of Botany, Rajshahi University, Bangladesh for future reference.

Plant Identification

The collected specimens were identified by consulting different Floras and literatures. The major collected materials were identified and described up to species with the help of Hooker (1877); Prain (1903); Kirtikar and Basu (1987). For the current name and up to date nomenclature Huq (1986), Ahmed, *et al.* (2008-2009) and Pasha and Uddin (2013) were consulted.

3. Results and Discussion

Diversity of angiosperms in Chaar Khidirpur area of Rajshahi, Bangladesh conducted during November 2018 to October 2019. A total of 210 species belonging to 177 genera and 71 families were recorded. Of these, Magnoliopsida (Dicotyledones) is represented by 189 species under 158 genera and 62 families while Liliopsida (Monocotyledones) is represented by 21 species under 19 genera and 9 families. Habit analysis shows that herbs, shrubs, climbers and trees are represented by 102, 29, 29, 50 species respectively (Table 1). Asteraceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Solanaceae, Acanthaceae, Moraceae are the dominant families with high species diversity. For each species scientific name, local name,

habit, flowering time, status of occurrence, voucher number and family were provided. Of 210 species recorded here, herbs are represented by 48.32%, shrubs by 13.87%, climber 13.87%, Trees by 23.92% species (Table 1; Figure 1). Out of 210 species, 81.33% species was common, 16.74% species was rare and 1.91% species was threatened in the study area (Figure 2). Distribution of angiosperm species in the families shows variation. Asteraceae is the dominant family represented by 19 species, followed by Cucurbitaceae (17 species), Euphorbiaceae (11 species), Fabaceae (11 species), Solanaceae (10 species), Acanthaceae (9 species), Amaranthaceae (7 species) and Moraceae (7 species). A single species is represented by 32 families while 2 to 6 species is represented by 31 families (Table 1 and 2).

Based on the study a preliminary list of angiosperm diversity in Chaar Khidirpur area of Rajshahi, Bangladesh conducted during November 2018 to October 2019. A total of 210 species belonging to 177 Genera under 71 families were recorded. (Table 1). The collected information is comparable with the result of other studies in Bangladesh. A total of 243 species belonging to 195 genera under 95 families were recorded in Khagrachhari district (Islam *et.al*, 2009). A total of 374 species belonging to 264 genera under 84 families were recorded in Lawachara National Park (Uddin & Hassan, 2010). A total of 153 species belonging to 120 genera under 52 families were recorded in Runctia Sal Forest (Tutul *et. al*, 2010). A total of 245 species belonging to 183 genera and 72 families are documented in Habiganj district (Anefin *et. al*, 2011). A total of 425 species belonging to 321 genera 108 families are recorded in Rajshahi district (Rahman, 2013). A total of 302 species belonging to 243 genera 84 families are recorded in Bangladesh Police Academy, Rajshahi (Rahman *et. al*, 2014). No published information recorded on the diversity of angiosperms in Chaar Khidirpur area of Rajshahi, Bangladesh.

The important medicinal plants were used by the local in the study area were documented. A total of 45 medicinal plants were collected and recorded for their use in 61 diseases (Table 3). These medicinal weeds are used by the local people to cure the following diseases, especially for constipation, dysentery, diuretic, indigestion, high blood pressure, diabetes, headache, heart disease, liver disease, pain, night blindness, skin disease, burning sensation, hair disease. abdominal pain, bronchitis, asthma, stomachic, astringent, cough and cold, piles, anemia, eczema, syphilis, urinary problem, ringworm, sexual disease, leprosy, vomiting and others. Similar works were done in Bangladesh like Ghani (2003), Yusuf *et al*. (2009), Anisuzzaman *et al*.(2007), Rahman (2021a), Rahman (2021b), Rahman and Khatun (2020), Choudhury and Rahmatullah (2012), Faruque and Uddin (2014) and Uddin *et al*. (2008).

Table 1: Showing the families of the plant species recorded.

Sl. No	Family Name	No. of the Herb species	No. of the Shurb species	No. of the Climber species	No. of the Tree species
1.	Acanthaceae	7	1	1	-
2.	Aloeaceae	1	-	-	-
3.	Amaranthaceae	7	-	-	-
4.	Anacardiaceae	-	-	-	2
5.	Annonaceae	-	-	-	3
6.	Apiaceae	2	-	-	-
7.	Apocynaceae	3	-	-	2

8.	Araceae	4	-	-	-
9.	Arecaceae	-	-	-	4
10.	Asclepiadaceae	-	2	-	-
11.	Asteraceae	19	-	1	-
12.	Basellaceae	-	-	1	-
13.	Bombacaceae	-	-	-	1
14.	Boraginaceae	1	-	-	-
15.	Brassicaceae	3	-	-	-
16.	Caesalpiniaceae	-	2	-	2
17.	Cannaceae	1	-	-	-
18.	Capparaceae	1	-	-	-
19.	Caricaceae	-	-	-	1
20.	Chenopodiaceae	3	-	-	-
21.	Combretaceae	-	-	-	1
22.	Commelinaceae	1	-	-	-
23.	Convolvulaceae	1	1	2	-
24.	Cosiaceae	1	-	-	-
25.	Crassulaceae	1	-	-	-
26.	Cucurbitaceae	-	-	17	-
27.	Cyperaceae	2	-	-	-
28.	Dilleniaceae	-	-	-	1
29.	Dioscoriaceae	-	-	1	-
30.	Elaeocarpaceae	-	-	-	1
31.	Euphorbiaceae	4	5	-	2
32.	Fabaceae	7	1	1	2
33.	Gentianaceae	1	-	-	-
34.	Lamiaceae	3	-	-	-
35.	Lauraceae	-	-	-	1
36.	Lemnaceae	1	-	-	-
37.	Liliaceae	2	-	1	-
38.	Lythraceae	-	1	-	1
39.	Malvaceae	3	1	-	-
40.	Meliaceae	-	-	-	2
41.	Menispermaceae	-	-	2	-
42.	Mimosaceae	-	-	-	3
43.	Molluginaceae	1	-	-	-
44.	Moraceae	-	-	-	7
45.	Moringaceae	-	-	-	1
46.	Musaceae	1	-	-	-
47.	Myrtaceae	-	-	-	3
48.	Oxalidaceae	1	-	-	1
49.	Orobanchaceae	1	-	-	-
50.	Papaveraceae	1	-	-	-
51.	Pedaliaceae	1	-	-	-
52.	Piperaceae	1	-	-	-
53.	Poaceae	1	2	-	-
54.	Polygonaceae	1	-	-	-
55.	Portulacaceae	1	-	-	-
56.	Puniceae	-	1	-	-
57.	Rhamnaceae	-	-	-	1
58.	Rosaceae	-	2	-	-
59.	Rubiaceae	-	1	-	1
60.	Rutaceae	-	2	-	2

61.	Sapindaceae	-	-	-	1
62.	Sapotaceae	-	-	-	2
63.	Scrophulariaceae	1	-	-	-
64.	Smilacaceae	-	-	1	-
65.	Solanaceae	8	2	-	-
66.	Sterculiaceae	-	1	-	-
67.	Ulmaceae	-	-	-	1
68.	Urticaceae	1	-	-	-
69.	Verbenaceae	1	5	-	-
70.	Vitaceae	-	-	1	-
71.	Zingiberaceae	2	-	-	-

Table 2. Documentation of Angiosperm Taxa in Chaar Khidirpur, Rajshahi, Bangladesh

Scientific name	Bangla name	Family name	Habit	Status of occurrence	Flowering time	Voucher no.
<i>Andrographis paniculata</i> (Burm. f.) Wall ex Ness.	Kalamegh	Acanthaceae	Herb	C	Jan-Mar	AA 108
<i>Barleria prionitis</i> L.	Kania-janti	Acanthaceae	Herb	C	Nov-Feb	AA 178
<i>Hemigraphis hirta</i> (Valil) T.Anders.	Buriana	Acanthaceae	Herb	C	Jan-Jul	AA 174
<i>Hygrophila schulli</i> (Buch-Ham.) M.R. & S.N.Almeida.	Kulekharha	Acanthaceae	Herb	R	Oct-Jan	AA 109
<i>Justicia gendarussa</i> Burm. f.	Jagathmadan	Acanthaceae	Herb	C	Apr-Aug	AA 201
<i>Justicia adhatoda</i> L.	Basok	Acanthaceae	Shrub	R	Jan-Apr	AA 179
<i>Nelsonia canescens</i> (Lamk.) Spreng.	Paramul	Acanthaceae	Herb	C	Oct-Feb	AA 110
<i>Ruellia tuberosa</i> L.	Chatpoty	Acanthaceae	Herb	C	Jan-Dec	AA 180
<i>Thunbergia grandiflora</i> (Roxh. ex Rotler) Roth.	Nillata	Acanthaceae	Clim	R	Jan-Dec	AA 187
<i>Aloe vera</i> (L.) Bum f.	Ghritakumari	Aloeaceae	Herb	C	Sep-Dec	AA129
<i>Amaranthus spinosus</i> L.	Katanotey	Amaranthaceae	Herb	C	Jan-Dec	AA 205
<i>Amaranthus viridis</i> L.	Notyshak	Amaranthaceae	Herb	C	Jan-Dec	AA 211
<i>Achyranthes aspera</i> L.	Aparg	Amaranthaceae	Herb	C	Jan-Dec	AA 210
<i>Aerva lanata</i> (L.) juss. ex Schult.	Chaya	Amaranthaceae	Herb	C	Apr-Jul	AA 134
<i>Alternanthera sessilis</i> R.Br	Chanshi	Amaranthaceae	Herb	C	Jan-Dec	AA 139
<i>Celosia cristata</i> L.	Morogful	Amaranthaceae	Herb	C	Jan-Dec	AA 135
<i>Dirgeria muricata</i> (L.) Mart.	Gungatika	Amaranthaceae	Herb	T	Feb-Jun	AA 147
<i>Magnifera indica</i> L.	Aam	Anacardiaceae	Tree	C	Jan-Apr	AA 162
<i>Spondias pinnata</i> (L.f.) Kurz.	Aamra	Anacardiaceae	Tree	C	Feb-Jun	AA 131
<i>Annona squamosa</i> L.	Sarifa	Annonaceae	Tree	C	Mar-Jul	AA 37
<i>Annona reticulata</i> L.	Nona, Ata	Annonaceae	Tree	C	Oct-Jan	AA 29
<i>Polyalthia longifolia</i> (Sonn.) Thw.	Debdaru	Annonaceae	Tree	C	Mar-Oct	AA 21
<i>Centella asiatica</i> (L.) Urban.	Thankuni	Apiaceae	Herb	C	Jan-Dec	AA142
<i>Daucus carota</i> L.	Gajor	Apiaceae	Herb	C	May-Aug	AA165
<i>Alstonia scholaris</i> (L.) R. Br.	Chatim	Apocynaceae	Tree	R	Nov-May	AA 96
<i>Carissa carandas</i> L.	Karamcha	Apocynaceae	Herb	C	Jan-Dec	AA 166

<i>Catharanthus roseus</i> (L.) G. Don.	Nayantara	Apocynaceae	Herb	C	Jan-Dec	AA 136
<i>Rauvolfia serpentina</i> (L.) Benth ex Kurz.	Sarpagandha	Apocynaceae	Herb	R	Jan-Dec	AA 204
<i>Thevetia peruviana</i> Pers.	Halidekarabi	Apocynaceae	Tree	C	Jan-Dec	AA 98
<i>Alocasia macrorrhizos</i> (L.) G. Don.	Mankochu	Araceae	Herb	C	Jul-Oct	AA190
<i>Amorphophallus campanulatus</i> (Roxb.) Bl.ex.Dense.	Olkochu	Araceae	Herb	C	May-Nov	AA121
<i>Colocasia esculenta</i> (L.) Schott.	Kochu	Araceae	Herb	C	May-Oct	AA191
<i>Typhonium trilobatum</i> (L.) Schott.	Camgash	Araceae	Herb	C	Apr-Oct	AA206
<i>Areca catechu</i> L.	Shupari	Arecaceae	Tree	C	Jan-Dec	AA119
<i>Borassus flabellifer</i> L.	Taal	Arecaceae	Tree	C	Jan-Oct	AA189
<i>Cocos nucifera</i> L.	Narkel	Arecaceae	Tree	C	Jan-Dec	AA158
<i>Phoenix sylvestris</i> Roxb.	Khejur	Arecaceae	Tree	C	Dec-May	AA120
<i>Calotropis procera</i> (Ait.) R. Br.	Akondo	Asclepiadaceae	Shrub	C	Apr-May	AA 137
<i>Calotropis gigantea</i> (L.) R.Br.	Akondo	Asclepiadaceae	Shrub	C	Apr-May	AA 168
<i>Ageratum conyzoides</i> L.	Ochunti	Asteraceae	Herb	C	Nov-Jun	AA112
<i>Blumea lacera</i> (Burm. f.) DC.	Borokucksim	Asteraceae	Herb	C	Nov-Jul	AA182
<i>Chromolaena odorata</i> L. King. & Robinson.	Germanlata	Asteraceae	Herb	R	Nov-May	AA130
<i>Cirsium arvense</i> (L.) Scop.	Shialkanta	Asteraceae	Herb	C	Feb-Jun	AA113
<i>Eclipta alba</i> (L.) Hassk.	Kalokeshi	Asteraceae	Herb	R	Jan-Dec	AA152
<i>Enhydra fluctuans</i> Lour.	Helencha	Asteraceae	Herb	C	Jan-Apr	AA114
<i>Gnaphalium luteo-ulbum</i> L.	Barakamra	Asteraceae	Herb	C	Mar-Aug	AA184
<i>Grangea maderaspatana</i> (L.) Poir.	Namuti	Asteraceae	Herb	R	Dec-May	AA153
<i>Hellianthus annuus</i> L.	Surjomukhi	Asteraceae	Herb	C	Jan-Dec	AA115
<i>Launaea aspleniifolia</i> DC.	Tikchana	Asteraceae	Herb	C	Jan-Aug	AA154
<i>Mikania cordata</i> (Bunn f.) Robinson.	Asamlata	Asteraceae	Clim	C	Oct-Feb	AA116
<i>Sonchus asper</i> (L.) Hill.	Sonpalong	Asteraceae	Herb	C	Sep-Jun	AA186
<i>Spilanthes acmella</i> (L.)L.	Marhatitiga	Asteraceae	Herb	R	Jan-Dec	AA 155
<i>Synedrella nodiflora</i> (L.) Gaertn.	Relanodi	Asteraceae	Herb	R	Jan-Dec	AA 203
<i>Tagetes erecta</i> L.	Genda	Asteraceae	Herb	C	Jan-Dec	AA 117
<i>Tridax procumbens</i> L.	Tridbara	Asteraceae	Herb	C	Jan-Dec	AA 25
<i>Vernonia cinerea</i> (L.) Less.	Kuksim	Asteraceae	Herb	C	Jan-Dec	AA105
<i>Wedelia trilobata</i> (L.) A S. Hitchc.	Keshraj	Asteraceae	Herb	C	Jan-Dec	AA 31
<i>Xanthium indicum</i> Koen ex Roxb.	Ghagra	Asteraceae	Herb	C	Jan-Dec	AA 157
<i>Youngia japonica</i> (L.) DC.	Youngful	Asteraceae	Herb	R	Aug-Jan	AA 44
<i>Basella rubra</i> L.	Pushak	Basellaceae	Clim	C	Nov-Feb	AA 58
<i>Bombax ceiba</i> L.	Shimul	Bombacaceae	Tree	C	Feb-Apr	AA 82

<i>Heliotropium indicum</i> L.	Hatishur	Boraginaceae	Herb	C	Jan-Dec	AA 123
<i>Brassica oleracea</i> L. var. <i>botrytis</i> L.	Phulkopi	Brassicaceae	Herb	C	Nov-Apr	AA 126
<i>Brassica oleracea</i> L. var. <i>capitata</i> L.	Badha kopi	Brassicaceae	Herb	C	Nov-Apr	AA 144
<i>Raphanus sativus</i> L.	Mula	Brassicaceae	Herb	C	Jan-May	AA 170
<i>Delonix regia</i> (Boyer) Raf.	Krishno chura	Caesalpiniaceae	Tree	C	Apr-Sep	AA 194
<i>Senna sophera</i> (L.) Roxb.	Kalka shunda	Caesalpiniaceae	Shrub	C	Dec-Mar	AA 198
<i>Senna alata</i> (L.) Roxb.	Dad mardan	Caesalpiniaceae	Shrub	R	Sep-Jan	AA 100
<i>Tamarindus indica</i> L.	Tentul	Caesalpiniaceae	Tree	C	Apr-Dec	AA 68
<i>Canna indica</i> L.	Kolaboti	Cannaceae	Herb	C	Apr-Nov	AA 71
<i>Cleome viscosa</i> L.	Hurhuria	Capparaceae	Herb	R	Jan-Dec	AA 76
<i>Carica papaya</i> L.	Pape	Caricaceae	Tree	C	Jan-Dec	AA 09
<i>Chenopodium album</i> L.	Bothua	Chenopodiaceae	Herb	C	Dec-Mar	AA 17
<i>Chenopodium ambrosioides</i> L.	Banbotua	Chenopodiaceae	Herb	C	Jan-Dec	AA 52
<i>Spinacia oleracea</i> L.	Palong shak	Chenopodiaceae	Herb	C	Feb-Mar	AA 88
<i>Terminalia arjuna</i> (Roxb. ex. DC)	Arjun	Combretaceae	Tree	C	Apr-Jul	AA 93
<i>Commelina benghalensis</i> L.	Kanshira	Commelinaceae	Herb	C	Apr-Nov	AA 40
<i>Evolvulus nummularius</i> (L.) L.	Bhuiokra	Convolvulaceae	Herb	C	Jan-Dec	AA 73
<i>Ipomoea batatas</i> (L.) Lamk.	Mistialu	Convolvulaceae	Clim	C	Jan-Dec	AA 48
<i>Ipomoea fistulosa</i> Mart. ex. Choisy in DC.	Dholkaln ii	Convolvulaceae	Shrub	C	Jan-Dec	AA 55
<i>Ipomoea aquatica</i> Forssk.	Kalmishak	Convolvulaceae	Clim	C	Jan-Oct	AA 60
<i>Costus speciosus</i> (Koenig ex Retz) Smith.	Keumul	Costaceae	Herb	R	Sep-Dec	AA 65
<i>Kalanchoe laciniata</i> (L.) Pers.	Himsagor	Crassulaceae	Herb	R	Jan-Mar	AA 124
<i>Benincasa hispida</i> (Thurb.) Cogn.	Chal kumra	Cucurbitaceae	Clim	C	May-Nov	AA 75
<i>Cucumis sativus</i> L.	Sosha	Cucurbitaceae	Clim	C	Apr-Sep	AA 103
<i>Citrullus lanatus</i> (Thunb.) Mat. & Nak.	Tormuj	Cucurbitaceae	Clim	C	Mar-Sep	AA 35
<i>Coccinia grandis</i> (L.) Voigt.	Telakucha	Cucurbitaceae	Clim	C	Mar-Dec	AA 50
<i>Cucumis melo</i> L.	Bangi	Cucurbitaceae	Clim	C	Mar-Jul	AA 58
<i>Cucurbita maxima</i> Duch.	Misti kumra	Cucurbitaceae	Clim	C	Mar-Aug	AA 91
<i>Gymnopetalum cochinchinense</i> (Lour.) Kurz.	Bati Jhinga	Cucurbitaceae	Clim	R	Jul-Dec	AA 150
<i>Lagenaria siceraria</i> (Monila) Standl.	Panilau	Cucurbitaceae	Clim	C	Feb-May	AA 172
<i>Luffa acutangula</i> (L.) Roxb.	Jhinga	Cucurbitaceae	Clim	C	Apr-Oct	AA 176
<i>Luffa cylindrica</i> (L.) Roem.	Dhundul	Cucurbitaceae	Clim	C	Jun-Dec	AA 185
<i>Momordica cochinchinensis</i> (Lour.) Spreng.	Kakrol	Cucurbitaceae	Clim	C	Jul-Nov	AA 193
<i>Momordica charantia</i> L.	Korolla	Cucurbitaceae	Clim	C	May-Oct	AA 05
<i>Mukia maderaspatana</i> (L.) M. Roem.	Agmuki	Cucurbitaceae	Clim	R	Jun-Dec	AA 23
<i>Trichossasthes cucumerina</i> L.	Ban chichinga	Cucurbitaceae	Clim	C	Apr-Jun	AA 181
<i>Trichossasthes dioica</i> Roxb.	Potol	Cucurbitaceae	Clim	C	Apr-Sep	AA 195
<i>Trichossasthes tricuspidata</i>	Makal	Cucurbitaceae	Clim	R	Jul-Dec	AA 140

Lour.						
<i>Trichossasthes anguina</i> L.	Chichinga	Cucurbitaceae	Clim	C	Apr-Jun	AA 192
<i>Cyperus rotundus</i> L.	Muthagas	Cyperaceae	Herb	C	Sep-Feb	AA 183
<i>Kyllinga nemoralis</i> (J.R. Forst. & G. Forst.) Dandv ex Hutchins. & Dal.	Nirbishi	Cyperaceae	Herb	C	Jun-Sep	AA 148
<i>Dillenia indica</i> L.	Chalta	Dilleniaceae	Tree	R	May-Oct	AA 171
<i>Dioscorea alata</i> L.	Chupri alu	Dioscoriaceae	Clim	R	Oct-Dec	AA207
<i>Elaeocarpus tectorius</i> (Lour.) Poir.	Jolpai	Elaeocarpaceae	Tree	R	May-Oct	AA 18
<i>Acalypha indica</i> L.	Mukta jhuri	Euphorbiaceae	Herb	C	Dec-Apr	AA 26
<i>Croton bonplandianus</i> Baill.	Ban morich	Euphorbiaceae	Herb	C	Jan-Dec	AA 188
<i>Euphorbia hirta</i> L.	Dudhiya	Euphorbiaceae	Herb	C	Jan-Dec	AA 200
<i>Jatropha gossypifolia</i> L.	Lal bherenda	Euphorbiaceae	Shrub	C	Apr-Aug	AA 143
<i>Jatropha curcas</i> L.	Jamalgot a	Euphorbiaceae	Shrub	R	Sep-Dec	AA 151
<i>Manihot esculenta</i> Crantz.	Kasava	Euphorbiaceae	Shrub	C	Sep-Jan	AA 202
<i>Phyllanthus niruri</i> L.	Bhuiamla	Euphorbiaceae	Herb	C	Aug-Oct	AA 175
<i>Phyllanthus reticulatus</i> Poir.	Chitki	Euphorbiaceae	Shrub	C	Mar-Oct	AA 42
<i>Phyllanthus emblica</i> L.	Amloki	Euphorbiaceae	Tree	R	Mar-Sep	AA 59
<i>Ricinus communis</i> L.	Bherenda	Euphorbiaceae	Shrub	C	Jan-Dec	AA 208
<i>Trewia nodiflora</i> L.	Batul, latim	Euphorbiaceae	Tree	C	Feb-Aug	AA 177
<i>Arachis hypogea</i> L.	China badam	Fabaceae	Herb	C	Mar-Dec	AA 209
<i>Cajanus cajan</i> (L.) Millsp.	Arhar	Fabaceae	Shrub	C	Dec-Apr	AA 111
<i>Desmodium triflorum</i> (L.) DC	Kudalia	Fabaceae	Herb	C	Jan-Dec	AA 07
<i>Dalbergia sissoo</i> Roxb.	Sissoo Gachh	Fabaceae	Tree	C	Mar-Jun	AA 32
<i>Desmodium gangeticum</i> (L.) DC.	Salpani	Fabaceae	Herb	C	Apr-Nov	AA 97
<i>Erythrina variegata</i> L.	Madar	Fabaceae	Tree	C	Feb-Mar	AA 156
<i>Lablab purpureus</i> (L.) Sweet.	Shim	Fabaceae	Clim	C	Nov-Mar	AA 199
<i>Lathyrus sativus</i> L.	Khesari	Fabaceae	Herb	C	Feb-Sep	AA 79
<i>Lens culinaris</i> Medic.	Masur	Fabaceae	Herb	C	Dec-Mar	AA 161
<i>Melilotus alba</i> Desr.	Sada Methi	Fabaceae	Herb	R	Mar-Oct	AA 196
<i>Vicia sativa</i> L.	Ankari	Fabaceae	Herb	C	Jul-Nov	AA 167
<i>Exacum pedunculatum</i> L.	Chiratta m	Gentianaceae	Herb	R	Feb-Apr	AA 133
<i>Sesamum indicum</i> L.	Til	Pedaliaceae	Herb	C	Feb-Oct	AA 159
<i>Leonurus sibiricus</i> L.	Roklodro n	Lamiaceae	Herb	C	Jan-Dec	AA 197
<i>Leucas aspera</i> (Willd) Link.	Shetodro n	Lamiaceae	Herb	C	Jan-Dec	AA 77
<i>Ocimum tenuiflorum</i> L.	Tulsi	Lamiaceae	Herb	R	Jan-Dec	AA 47
<i>Litsea glutinosa</i> (Lour.) Rob.	Menda	Lauraceae	Tree	T	Apr-Jan	AA 141
<i>Lemna perpusilla</i> Torrey	Khudi pana	Lemnaceae	Herb	C	Jan-Dec	AA 169
<i>Allium sativum</i> L.	Rosun	Liliaceae	Herb	C	Feb-Apr	AA 84
<i>Allium cepa</i> L.	Piyaj	Liliaceae	Herb	C	Feb-Jun	AA 15
<i>Asparagus racemosus</i> Willd.	Satamili	Liliaceae	Clim	R	Nov-Mar	AA 54
<i>Lagestroemia speciosa</i> (L.) Pers.	Jarul	Lythraceae	Tree	C	Apr-Aug	AA 30

<i>Lawsonia inermis</i> L.	Mehedi	Lythraceae	Shrub	C	Jun-Dec	AA 56
<i>Abelmoschus esculentus</i> (L.) Moench.	Bhindi	Malvaceae	Herb	C	Jan-Dec	AA 160
<i>Abutilon indicum</i> (L.) Sweet.	Petari	Malvaceae	Herb	C	Jul-Apr	AA 95
<i>Hibiscus rosa-sinensis</i> L.	Joba	Malvaceae	Shrub	C	Jan-Dec	AA 92
<i>Sida cordifolia</i> L.	Berela	Malvaceae	Herb	C	Sep-Dec	AA 99
<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	Tree	C	Mar-Jul	AA 33
<i>Swietenia mahagoni</i> Jacq.	Mahagoni	Meliaceae	Tree	C	Apr-Nov	AA 38
<i>Stephania japonica</i> (Thunb.) Miers.	Akanadi	Menispermaceae	Clim	R	Jan-Dec	AA 41
<i>Tinospora cordifolia</i> (Willd.) Hook. f & Thoms.	Gulancha	Menispermaceae	Clim	R	Jan-Oct	AA 43
<i>Acacia catcechu</i> (L.f.) Willd.	Khair	Mimosaceae	Tree	R	Mar-Dec	AA 12
<i>Acacia nilotica</i> (L.) Del.	Babla	Mimosaceae	Tree	C	Apr-Aug	AA 145
<i>Albizia procera</i> (Roxb.) Benth.	Silkoroi	Mimosaceae	Tree	C	Jan-Dec	AA 53
<i>Mollugo pentahylla</i> L.	Khetpapra	Molluginaceae	Herb	C	Jun-Jan	AA 85
<i>Artocarpus lacucha</i> Buch-Ham.	Dewa	Moraceae	Tree	T	Apr-Jun	AA 146
<i>Artocarpus heterophyllus</i> Lamk.	Kathal	Moraceae	Tree	C	Feb-Jul	AA 94
<i>Ficus hispida</i> L.f.	Khoksa	Moraceae	Tree	C	Apr-Sep	AA 57
<i>Ficus racemosa</i> L.	Jagdumur	Moraceae	Tree	C	Sep-Nov	AA 13
<i>Ficus religiosa</i> L.	Pakur	Moraceae	Tree	C	Mar-Oct	AA 27
<i>Ficus benghalensis</i> L.	Bot	Moraceae	Tree	C	May-Aug	AA 61
<i>Sterblus asper</i> Lour.	Sheora	Moraceae	Tree	R	Feb-Jun	AA 100
<i>Moringa oleifera</i> Lamk.	Sajna	Moringaceae	Tree	C	Jan-Dec	AA 66
<i>Musa paradisiaca</i> L.	Kola	Musaceae	Herb	C	Jan-Dec	AA 101
<i>Psidium guajava</i> L.	Peyara	Myrtaceae	Tree	C	Jan-Dec	AA 70
<i>S. samarangense</i> (Blume) Merr & Perry	Jamrul	Myrtaceae	Tree	C	Feb-Mar	AA 34
<i>Syzygium cumini</i> (L.) Skeels.	Jam	Myrtaceae	Tree	C	Mar-Jun	AA 173
<i>Averrhoa carambola</i> L.	Kamranga	Oxalidaceae	Tree	C	Sep-Mar	AA 72
<i>Oxalis corniculata</i> L.	Amrul	Oxalidaceae	Herb	C	Sep-May	AA 24
<i>Orobanche agyptica</i> Pers.	Orobanchi	Orobanchaceae	Herb	C	Nov-Mar	AA 210
<i>Argemone mexicana</i> L.	Sheyalkata	Papaveraceae	Herb	C	Feb-Jun	AA 01
<i>Peperomia pellucida</i> (L.) H.B & K.	Iuchi Pata	Piperaceae	Herb	C	Jul-Sep	AA 149
<i>Bambusa bambos</i> (L.) Voss.	Bash	Poaceae	Shrub	C	Jan-Dec	AA 74
<i>Cynodon dactylon</i> (L.) Pers.	Durba	Poaceae	Herb	C	Jan-Dec	AA 67
<i>Zea mays</i> L.	Vutta	Poaceae	Shrub	C	Mar-Apr	AA 163
<i>Persicaria hydropiper</i> (L.) Spach.	Biskatali	Polygonaceae	Herb	C	Aug-Apr	AA 03
<i>Portulaca oleracea</i> L.	Baranuni	Portulacaceae	Herb	C	May-Jul	AA 28
<i>Punica granatum</i> L.	Dalim	Punicaceae	Shrub	C	Jan-Dec	AA 62
<i>Zizyphus mauritiana</i> Lamk.	Boroi	Rhamnaceae	Tree	C	Sep-Jan	AA 128
<i>Rosa centifolia</i> L.	Golap	Rosaceae	Shrub	C	Jan-Dec	AA 164
<i>Ixora coccinea</i> L.	Rongon	Rubiaceae	Shrub	C	Jan-Dec	AA 39
<i>Neolamarckia cadamba</i> (Roxb.) Bosser.	Kadom	Rubiaceae	Tree	C	May-Jul	AA 63
<i>Aegle marmelos</i> (L.) Corr.	Bel	Rutaceae	Tree	C	Apr-Dec	AA 90
<i>Citrus aurantifolia</i> (Christm. & Panzer) Swingle.	Labu	Rutaceae	Shrub	C	Mar-Sep	AA 122
<i>Citrus maxima</i> (Burm.) Merr.	Jambura	Rutaceae	Tree	C	Feb-Nov	AA 89

<i>Limonia acidissima</i> L.	Kothbel	Rutaceae	Tree	C	Feb-Dec	AA 106
<i>Murraya paniculata</i> (L.) Jack.	Kamini	Rutaceae	Shrub	C	Mar-Jan	AA 138
<i>Litchi chinensis</i> Sonn.	Lichu	Sapindaceae	Tree	C	Apr-Jun	AA 102
<i>Manikara zapota</i> (L.) P. van Roven.	Sofeda	Sapotaceae	Tree	C	May-Jun	AA 45
<i>Mimusops elengi</i> L.	Bokul	Sapotaceae	Tree	C	Mar-Jun	AA 64
<i>Scoparia dulcis</i> L.	Bondone	Scrophulariaceae	Herb	C	Jan-Dec	AA 21
<i>Smilax macrophylla</i> Roxb.	Kumari lata	Smilacaceae	Clim	R	Nov-Mar	AA 49
<i>Capsicum frutescens</i> L.	Morich	Solanaceae	Herb	C	Jan-Dec	AA 46
<i>Datura metel</i> L.	Dhatura	Solanaceae	Shrub	C	Jan-Dec	AA 104
<i>Lycopersicon esculentum</i> Mill.	Tomato	Solanaceae	Herb	C	Sep-Apr	AA 118
<i>Nicotiana plumbaginifolia</i> Viv.	Bontama k	Solanaceae	Herb	C	Jan-Dec	AA 127
<i>Physalis minima</i> L.	Kopal Phutki	Solanaceae	Herb	C	Jan-Dec	AA 02
<i>Solanum nigrum</i> L.	Titbegun	Solanaceae	Herb	C	Jan-Dec	AA 20
<i>Solanum torvum</i> Swartz.	Gota Begun	Solanaceae	Shrub	C	Dec-Feb	AA 16
<i>Solanum tuberosum</i> L.	Golalu	Solanaceae	Herb	C	Oct-Feb	AA 08
<i>Solanum virginianum</i> L.	Kantakari	Solanaceae	Herb	C	Oct-Feb	AA 51
<i>Solanum melongena</i> L.	Begun	Solanaceae	Herb	C	Oct-Feb	AA 04
<i>Abroma augusta</i> (L.) L.f.	Ulat kambal	Sterculiaceae	Shrub	T	Jun-Dec	AA 80
<i>Trema orientalis</i> (L.) Blume.	Jibon	Ulmaceae	Tree	C	Jan-Jun	AA 06
<i>Pouzolzia zeylanica</i> (L.) Benn.	kullaruki	Urticaceae	Herb	C	Jan-Dec	AA 81
<i>Clerodendrum inerme</i> (L.) Gretn.	Bamun hati	Verbenaceae	Shrub	C	Jul-Nov	AA 10
<i>Clerodendrum viscosum</i> Vent.	Bhat	Verbenaceae	Shrub	C	Jan-Jul	AA 107
<i>Duranta repens</i> L.	Kiilo mehedhi	Verbenaceae	Shrub	C	Jan-Dec	AA 11
<i>Lantana camara</i> L.	Chotra	Verbenaceae	Shrub	C	Jan Dec	AA 22
<i>Phyla nodiflora</i> (L.) Greene	Khudi okra	Verbenaceae	Herb	C	Jan-Dec	AA 83
<i>Vitex negunda</i> L.	Nisinda	Verbenaceae	Shrub	R	Apr-Feb	AA 86
<i>Vitis trifolia</i> (L.) Domin.	Amallata	Vitaceae	Clim	R	Jan-Dec	AA 69
<i>Cucurma longa</i> L.	Holud	Zingiberaceae	Herb	C	Mar-Oct	AA 132
<i>Zingiber officinale</i> Roscoe	Ada	Zingiberaceae	Herb	C	Mar-Aug	AA 125

Jan = January, Feb = February, Mar = March, Apr = April, Ma = May, Jun = June, Jul = July, Aug = August, Sep = September, Oct = October, Nov = November, Dec = December, Clim = Climber, C = Common, T = Threatened species, R = Rare

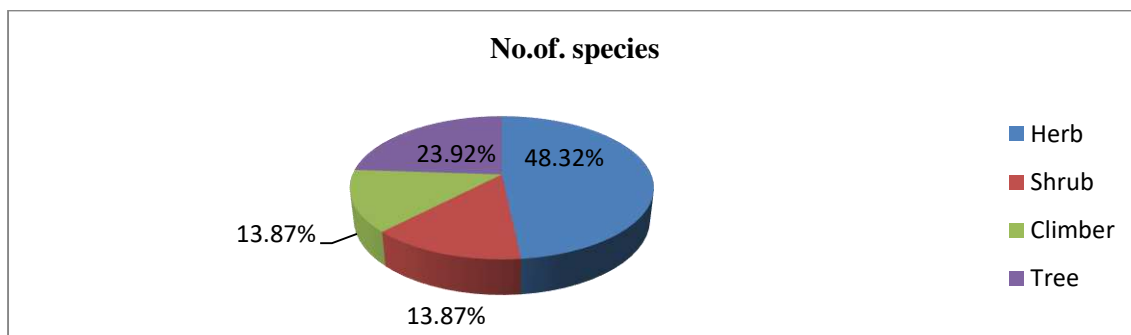


Figure 1: Habit diversity of the recorded species

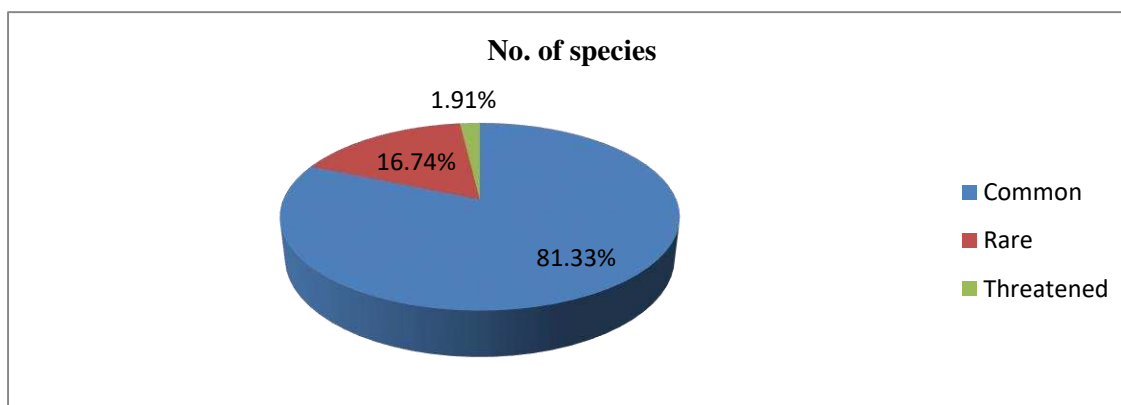


Figure 2: Recorded status of occurrence in the study area

Table 3: Medicinal plants used by the local people in Chaar Khidirpur area of Rajshahi.

Scientific name	Local name	Family name	Habit	Parts used	Medicinal Uses
<i>Aloe indica</i> (L.) Burm. f.	Ghrita kumari	Aloceae	Herb	Leaf	The juice of leaves is used for hair disease, constipation, weakness, sexual disease and burning sensation.
<i>Spondius pinnata</i> (L.f) Kurz	Aamra	Anacardiaceae	Tree	Bark, fruit	The bark is used in the treatment of stomach aches and dysentery. Fruit is used as fever.
<i>Annona squamosa</i> L.	Aafa	Annonaceae	Tree	Fruit	Fruit is used as astringents in diarrhea and dysentery.
<i>Polyalthia longifolia</i> Benth Hook	Debdarue	Annonaceae	Tree	Stem, bark, leaf	Stem, bark, leaves are exhibits antioxidant properties.
<i>Centella asiatica</i> (L.) Urb	Thankuni	Apiceae	Herb	Leaf	Leaf is used is alternative, astringent, tonic and diuretic.
<i>Carissa carandas</i> (L.) K. schum	Karomcha	Apocynaceae	Herb	Fruit	The fruit has been used remedy for diabetes.
<i>Catharanthus roseus</i> L.	Noyontara	Apocynaceae	Herb	Leaf	Leaf juice is applied to wasp-sting.
<i>Rauwolfia serpentina</i> (L.) Benth	Sarpa gandha	Apocynaceae	Shrub	Root	Root juice is a valuable remedy in high blood pressure.
<i>Calotropis gigantea</i> L.	Akondo	Asclepiadaceae	Shrub	Root	Root bark is useful for constipation and indigestion.
<i>Tagetes patula</i> L.	Genda phul	Asteraceae	Herb	Leaf	Leaves are good for kidney muscular pair and piles.
<i>Carica papaya</i> L.	pepe	Caricaceae	Tree	Root	Root extract is used for cancer of the uterus and syphilis.
<i>Terminalia arjuna</i>	Arjun	Combretaceae	Tree	Stem	Stem juice is used for prevention of heart disease.
<i>Commelina benghalensis</i>	Kanshira	Commelinaceae	Herb	Leaf	Leaf juice is used to prevent urinary problem.
<i>Benincasa hispida</i> (Thurb) cogn.	Chal kumra	Cucurbitaceae	climber	Fruit	Fruits are laxative and diuretic.

<i>Cucumis melo</i> L.	Bhangi	Cucurbitaceae	climber	Fruit	The pulp of the fruit is used as diuretic.
<i>Cucurbita maxima</i> Duch	Misti kumra	Cucurbitaceae	climber	Fruit	The fruit pulp is used as a poultice to burns.
<i>Luffa acutangula</i> (L.) Roxb	Jhinga	Cucurbitaceae	climber	Leaf	Leaf paste is applied to leprosy haemorrhoids.
<i>Luffa cylindrica</i> (L.) Roem	koror	Cucurbitaceae	climber	Fruit	Fruits are expectorant tonic, laxative and diuretic.
<i>Trichossasthes dioica</i> Roxb	Potol	Cucurbitaceae	climber	Leaf	The leaves are antepyratic.
<i>Elaeocarpus robustus</i> Roxb	Jolpai	Elaeocarpaceae	Tree	Fruit	Fruit is used in dysentery, diabetes and diarrhea.
<i>Acalypha indica</i> L.	Muktajhuri	Euphrbiaceae	Herb	Whole plant	Whole plant paste is used skin diseases, eczema, and skin fungal infection.
<i>Croton bonplandianus</i> Bail	Banmorich	Euphrbiaceae	Herb	Seed	Seed paste is applied locally on eczema and ringworm.
<i>Euphorbia hirta</i> L.	Dudhiya	Euphorbiaceae	Herb	Whole plant	The plant is astringent and haemostatic.
<i>Sesamum indicum</i> L.	Tili	Pedaliaceae	Herb	Seed	Seeds are used against piles.
<i>Leucas aspera</i> (wild) Link.	Shetodron	Lamiaceae	Herb	Leaf	Juice of leaves is applied in skin eruption.
<i>Ocimum tenuiflorum</i> L.	Tulsi	Lamiaceae	Shrub	Leaf	Leaf juice is used in cough and cold.
<i>Lawsonia inermis</i> Linn	Mehedi	Lythraceae	Shrub	Leaf	Leaf paste is used in skin diseases.
<i>Abelmoschus esculentus</i> (L.) moench	Bhindi	Malvaceae	Herb	Fruit	Fruits are cooling stomachic, astringent and diarrhea.
<i>Acacia catechu</i> (L.f.) wild	Khair	Mimosaceae	Tree	Bark	Bark is astringent, antidysenteric.
<i>Ficus hispida</i> L.f.	khoksa	Moraceae	Tree	Leaf	It is useful in piles, anemia.
<i>Psidium guajava</i> L.	Peyara	Myrtaceae	Tree	Root	Root paste mixed with water used to treat diarrhea and dysentery.
<i>Syzygium cumini</i> (L.) skeels	Jam	Myrtaceae	Tree	Fruit	it is good for bronchitis, asthma & dysentery.
<i>Punica granatum</i> L.	Dalim	Punicaceae	Shrub	Stem	Young stem is used for abdominal pain.
<i>Aegle marmelos</i> (L.) corr	Bel	Rutaceae	Tree	Fruit	Unripe fruit is used in diarrhea, dysentery and ripe fruit is used for constipation.
<i>Citrus aurantifolia</i> L.	Labu	Rutaceae	Tree	Fruit	Fruits are used against skin irritation and nausea.
<i>Citrus maxima</i> (Burm.) Merr.	Jambura	Rutaceae	Tree	Fruit	Fruit is useful in vomiting and diarrhea.
<i>Limonia acidissima</i> L.	Kodbel	Rutaceae	Tree	Fruit	Fruit is stimulant, astringent, aphrodisiac, diuretic, cardio-tonic to the livers and lungs.
<i>Litchi chinensis</i> Sonn	Lichu	Sapindaceae	Tree	Fruit	Fruits are tonic to the heart, brain and liver.
<i>Capsicum frutescens</i> L.	morich	Solanaceae	Herb	Leaf	Leaves are used in headache, pain, night blindness.

<i>Nicotiana plumbaginifolia</i> viv	Bontamak	Solanaceae	Herb	Leaf	Leaf juice is used for skin disease.
<i>Physalis minima</i> L.	kopaittka	Solanaceae	Herb	Fruit	Fruits are tonic, diuretic and purgative.
<i>Solanum melongena</i> L.	Begum	Solanaceae	shrub	Fruit	Unripe fruit is laxative, analgesic, cardio-tonic.
<i>Abroma augusta</i> L.	Ulatkambal	Sterculiaceae	shrub	Root	Root bark is used in irregular menses pain.
<i>Vitex negundo</i> L.	Nisinda	Verbenaceae	Shrub	Leaf	Leaves are tonic, vermifuge & anti-parasite.
<i>Zingiber officinale</i> Rose.	Ada	Zingiberaceae	Herb	Rhizome	Rhizome juice It's used in constipation, dysentery and vomiting.

4. Conclusion and Suggestion

The diversity of angiosperm taxa in the Chaar Khidirpur area of Rajshahi, Bangladesh was recorded. The total numbers of the recorded species of angiosperms were 177 genera belonging to 71 families. The distribution of angiosperm plant species in the families shows variation. Asteraceae was represented by 19 species. Cucurbitaceae was represented by 17 species. Fabaceae and Euphorbiaceae were represented by 11 species each. Solanaceae was represented by 10 species. Acanthaceae was represented by 9 species. A single species was represented by 32 families while 2 to 7 species was represented by 33 families. The following species were found rarely distributed in the study area like *Vitex negundo* L., *Stephania japonica* (Thunb.) Miers., *Exacum pedunculatum* L., *Dillenia indica* L., *Senna alata* (L.) Roxb., *Justicia adhatoda* L., *Hygrophila schulli* (Buch-Ham.) M.R. & S.N.Almeida., *Thunbergia grandiflora* (Roxh. ex Rotler) Roth., *Alstonia scholaris* (L.) R. Br., *Rauwolfia serpentina* (L.) Benth ex Kurz., *Chromolaena odorata* L. King. & Robinson., *Eclipta alba* (L.) Hassk., *Grangea maderaspatana* (L.) Poir., *Spilanthes acmella* (L.)L., *Synedrella nodiflora* (L.) Gaertn., *Youngia japonica* (L.) DC., *Cleome viscosa* L., *Costus speciosus* (Koenig ex Retz) Smith., *Kalanchoe laciniata* (L.) Pers., *Gymnopetalum cochinchinense* (Lour.) Kurz., *Mukia maderaspatana* (L.) M. Roem., *Trichostema tricuspidata* Lour., *Dioscorea alata* L., *Elaeocarpus tectorius* (Lour.) Poir., *Jatropha curcas* L., *Phyllanthus emblica* L., *Melilotus alba* Desr., *Exacum pedunculatum* L., *Ocimum tenuiflorum* L., *Asparagus racemosus* Willd., *Stephania japonica* (Thunb.) Miers., *Tinospora cordifolia* (Willd.) Hook. f & Thoms. and *Dirgeria muricata* (L.) Mart., *Abroma augusta* (L.) L.f., *Artocarpus lacucha* Buch-Ham., *Litsea glutinosa* (Lour.) Rob. are threatened species in the study area. Forty-five (45) medicinal plants were used for the treatment of more than 61 diseases. These medicinal plants were useful in the discovery of new herbal medicines. All collected specimens were studied, identified and have been lodged in the Herbarium, Department of Botany, University of Rajshahi, Bangladesh.

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Conflict of Interest

None declared.

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Data and Materials Availability

All data associated with this study are presented in this paper.

Peer-review

External peer-review was done through double blind method.

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