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The Fabaceae family in Bangladesh: Floristic analysis, species diversity, and new additions to the flora

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ABSTRACT

This study presents a comprehensive floristic analysis of the Fabaceae family in Bangladesh, highlighting its taxonomy, ecological significance, and conservation implications. Based on extensive reviews of published literature and herbarium records, 606 species across 147 genera were documented. Significant findings include the identification of *Crotalaria* (40 species), *Dalbergia* (34 species), and *Indigofera* (25 species) as the most species-rich genera, with a high Simpson's Diversity Index of 0.98, reflecting substantial biodiversity and evenness. Life form analysis revealed dominance by trees (26.45%) and climbers (26.15%), with native species comprising 79% of the documented flora. The geographical distribution revealed the highest species concentration in the Chittagong division (31.64%), followed by Sylhet and Dhaka regions. This study also highlights 198 newly recorded species, emphasizing their importance for conservation and sustainable utilization. These findings contribute to understanding the ecological role of Fabaceae in supporting soil health, biodiversity, and agriculture in Bangladesh, offering a foundation for further research and conservation efforts.

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INTRODUCTION

The family Fabaceae, commonly known as the legume, pea, or bean family, is one of the largest families of flowering plants, encompassing a diverse range of species with significant ecological, economic, and cultural importance. Globally, Fabaceae comprises over 19,500 species across 750 genera, making it the third-largest family of angiosperms (Christenhusz and Byng, 2016). This family is distributed across diverse habitats, including tropical, subtropical, and temperate regions, demonstrating exceptional adaptability and diversity (Smýkal *et al.*, 2015). Members of Fabaceae are notable for their nitrogen-fixing ability, which plays a crucial role in enhancing soil fertility and sustaining agricultural ecosystems (Kebede, 2021). As a result, they are integral to both natural and cultivated ecosystems, contributing to global food security and ecosystem stability.

In Bangladesh, Fabaceae ranks among the most prominent plant families, with species adapted to various ecological zones, from mangroves to highlands. These plants fulfill multiple roles, ranging from primary producers in the food chain to sources of timber, medicine, and fodder (Yahara *et al.*, 2013). Economically, several species, such as *Cicer arietinum* (chickpea), *Glycine max* (soybean), and *Vigna radiata* (mung bean), are vital agricultural commodities. Others, like *Albizia* spp., are used in agroforestry systems for their ability to improve soil structure and provide shade for crops. Ornamental species like *Cassia fistula*, *Delonix regia*, *Butea monosperma* and *Bauhinia variegata* add aesthetic value to landscapes.

The Fabaceae family comprises a variety of life forms, including herbs, shrubs, trees, and climbers, and thrives across diverse habitats. Despite its significance, comprehensive studies focusing on the taxonomy, species diversity, and geographic distribution of Fabaceae in Bangladesh have been limited. Previous floristic studies in the region have provided fragmented insights, often lacking a unified approach to understanding the family's diversity and ecological contributions (Ahmed *et al.*, 2009). Recent taxonomic advancements and updated databases such as Plants of the World Online (POWO) have provided opportunities to reassess and update the inventory of Fabaceae species in the country (POWO, 2023).

This study aims to address these gaps by presenting an updated account of the Fabaceae species in Bangladesh, analyzing species diversity using Simpson's Diversity Index, and mapping their geographic distribution. Species diversity is a key metric for assessing ecosystems, as it reflects both species richness and evenness within a community (Roswell *et al.*, 2021). The study employs Simpson's Diversity Index, which accounts for the relative abundance of species, to quantify the biodiversity of Fabaceae in Bangladesh. This metric is particularly useful in identifying regions of high biodiversity and prioritizing conservation efforts.

Furthermore, the geographic distribution of species provides critical insights into the ecological patterns and environmental conditions of various regions. This research identifies biodiversity hotspots within Bangladesh, with a focus on areas like the Chittagong and Sylhet divisions, which are rich in Fabaceae species. Such findings not only enhance our understanding of the Fabaceae family in Bangladesh but also provide a foundation for conservation planning and sustainable utilization of these plant resources.

The outcomes of this study contribute to global efforts to document biodiversity and address challenges related to habitat loss and climate change. In addition, they offer practical implications for agriculture, forestry, and ecosystem management in Bangladesh and beyond. By presenting a detailed analysis of species diversity, life forms, and geographic distribution, this study highlights the importance of Fabaceae in supporting ecological balance and human well-being, while paving the way for further research and conservation initiatives.

MATERIALS AND METHODS

An extensive review of existing literature, herbarium records, and online databases, particularly Plants of the World Online (POWO), was performed to compile a comprehensive list of Fabaceae species in Bangladesh. Observations included the plant's habit (herb, shrub, tree, or climber), native or introduced status, and ecological context.

Species diversity is one of the most significant metrics that are used to assess ecosystems at various scales (Sghair and Mahklouf, 2020). The species level is the main focus of typical biodiversity measurements, however different indices can be used to study local diversity (Eshaghi *et al.*, 2009). Species diversity was quantified using Simpson's Diversity Index, a widely used measure of biodiversity that accounts for both species richness and evenness. Simpson's index diversity values go between 0 and 1, with a value closer to 1 denoting greater diversity and a value closer to 0 denoting less diversity (Kent, 2011). The diversity score for the family Fabaceae in this study is determined by Simpson's diversity index, which takes into account both the number of different species in each genus and the number of individuals in each species.

The formula for calculating Simpson's index is:

$$\text{Simpson's Diversity Index (D)} = 1 - \frac{\sum ni(ni-1)}{N(N-1)}$$

Where N = the total number of all species in the family Fabaceae.

n_i = the numbers of species of each genus

$\sum n_i(n_i\text{-}1) = 7162$

$N (N\text{-}1) = 606 (606\text{-}1) = 366{,}630$

Simpson's Diversity Index = 1- (7162/366,630)=0.98

Geographic distribution was analyzed by categorizing species based on their presence in different districts and regions of Bangladesh. Species occurrence data were plotted to identify biodiversity hotspots and assess regional patterns of distribution. The proportion of species in each region was calculated and visualized using pie charts.

Descriptive statistics were used to summarize the distribution of species across life forms (herbs, shrubs, trees, and climbers) and regions. The data were processed using Microsoft Excel software for visualization. Statistical analyses were performed to identify correlations between geographic regions and species richness.

This study relied on secondary data from herbarium records and databases, which may not fully reflect the current distribution of species due to habitat changes and anthropogenic influences. Future studies should integrate molecular techniques and long-term ecological monitoring for more comprehensive assessments.

RESULTS

The study documented a total of 606 species belonging to 147 genera in the family Fabaceae from Bangladesh. This study has made a groundbreaking contribution to the understanding of Bangladesh's botanical diversity by documenting the addition of 198 species belonging to the Fabaceae family to the country's flora (Table 1). The new addition of these species not only enriches the nation's botanical records but also highlights the underexplored diversity within its ecosystems. These species represent a wide range of life forms, including herbs (24.92%), shrubs (22.48%), trees (26.45%), and climbers (26.15%). Trees and climbers together accounted for more than half of the species, indicating the ecological significance of these growth forms in the country's diverse habitats (Fig. 1).

Among the genera, *Crotalaria* (40 species), *Dalbergia* (34 species) and *Indigofera* (25 species) were the most species-rich. Genera such as *Vigna* and *Flemingia* also contributed significantly to the family's diversity, with 17 and 14 species, respectively (Table 2). These genera reflect the adaptability of Fabaceae members to varied ecological conditions in Bangladesh.

Table 1. List of new additions to the family Fabaceae for the Flora of Bangladesh

Sl	Scientific Name	Habit	Native or introduced	Reference
1.	*Abrus melanospermus* Hassk.	Climber	Native	(POWO, 2023)
2.	*Abrus melanospermus* subsp. *melanospermus*	Climber	Native	(POWO, 2023)
3.	*Abrus precatorius* L. subsp. *precatorius*	Climber	Native	(POWO, 2023)
4.	*Adenanthera pavonina* L. var. *pavonine*	Tree	Native	(POWO, 2023)
5.	*Aeschynomene americana* var. *americana*	Herb	Introduced	(POWO, 2023)
6.	*Aganope thyrsiflora* (Benth.) Polhill	Climber	Native	(POWO, 2023)
7.	*Albizia julibrissin* var. *julibrissin*	Shrub or Tree	Native	(POWO, 2023)
8.	*Alysicarpus bupleurifolius* var. *bupleurifolius*	Herb	Native	(POWO, 2023)
9.	*Alysicarpus heyneanus* Wight & Arn.	Herb	Native	(POWO, 2023)
10.	*Alysicarpus heyneanus* var. *ludens* (Baker) Pramanik & Thoth.	Herb	Native	(POWO, 2023)
11.	*Alysicarpus monilifer* (L.) DC.	Herb	Native	(POWO, 2023)
12.	*Alysicarpus rugosus* subsp. *rugosus*	Herb	Native	(POWO, 2023)
13.	*Alysicarpus tetragonolobus* Edgew.	Herb	Native	(POWO, 2023)
14.	*Alysicarpus tetragonolobus* var. *tetragonolobus*	Herb	Native	(POWO, 2023)
15.	*Alysicarpus vaginalis* (L.) DC. var. *vaginalis*	Herb	Native	(POWO, 2023)
16.	*Archidendron clypearia* subsp. *clypearia*	Shrub or Tree	Native	(POWO, 2023)
17.	*Bauhinia brachycarpa* Wall. ex Benth.	Shrub or Tree	Native	(POWO, 2023)
18.	*Bauhinia variegata* var. *candida* Voigt	Tree	Native	(POWO, 2023)
19.	*Bauhinia variegata* var. *variegata*	Shrub or Tree	Native	(POWO, 2023)
20.	*Bauhinia viridescens* Desv.	Shrub or Tree	Native	(POWO, 2023)
21.	*Bauhinia viridescens* Desv. var. *viridescens*	Shrub or Tree	Native	(POWO, 2023)
22.	*Brownea coccinea* subsp. *coccinea*	Tree	Introduced	(POWO, 2023)
23.	*Cajanus cajanifolius* (Haines) *Maesen*	Shrub	Native	(POWO, 2023)
24.	*Cajanus crassus* var. *crassus*	Climber	Native	(POWO, 2023)
25.	*Cajanus scarabaeoides* (L.) Thouars var. *scarabaeoides*	Climber	Native	(POWO, 2023)
26.	*Calliandra haematocephala* var. *haematocephala*	Shrub or Tree	Introduced	(POWO, 2023)
27.	*Calliandra houstoniana* (Mill.) Standl.	Shrub or Tree	Introduced	(POWO, 2023)
28.	*Calliandra houstoniana* var. *calothyrsus* (Meisn.) Barneby	Shrub or Tree	Introduced	(POWO, 2023)
29.	*Calliandra selloi* (Spreng.) J.F.Macbr.	Shrub	Introduced	(POWO, 2023)
30.	*Calliandra tergemina* (L.) Benth.	Shrub or Tree	Introduced	(POWO, 2023)
31.	*Campylotropis speciosa* (Royle ex Schindl.) Schindl.	Shrub	Native	(POWO, 2023)
32.	*Campylotropis speciosa* subsp. *eriocarpa* (Schindl.) Iokawa & H.Ohashi	Shrub	Native	(POWO, 2023)
33.	*Canavalia africana* Dunn	Climber	Native	(POWO, 2023)
34.	*Canavalia gladiolata* J.D.Sauer	Climber	Native	(POWO, 2023)
35.	*Canavalia lineata* (Thunb.) DC.	Climber	Native	(POWO, 2023)
36.	*Cassia javanica* subsp. *agnes* (de Wit) K.Larsen	Tree	Native	(POWO, 2023)
37.	*Cassia javanica* subsp. *javanica*	Tree	Introduced	(POWO, 2023)
38.	*Cassia javanica* subsp. *renigera* (Wall. ex Benth.) K.Larsen	Tree	Introduced	(POWO, 2023)
39.	*Chamaecrista nictitans* (L.) Moench	Herb	Introduced	(POWO, 2023)
40.	*Chamaecrista nictitans* var. *glabrata* (Vogel) H.S.Irwin & Barneby	Herb	Introduced	(POWO, 2023)
41.	*Chamaecrista nomame* (Makino) H. Ohashi	Herb	Native	(POWO, 2023)
42.	*Chamaecrista nomame* var. *nomame*	Herb	Native	(POWO, 2023)
43.	*Cheniella glauca* (Benth.) R.Clark & Mackinder	Climber	Native	(POWO, 2023)
44.	*Christia obcordata* (Poir.) Bakh.f.	Climber	Introduced	(POWO, 2023)
45.	*Christia obcordata* var. *obcordata*	Climber	Introduced	(POWO, 2023)
46.	*Christia vespertilionis* (L.f.) Bakh.f. var. *vespertilionis*	Herb	Introduced	(POWO, 2023)
47.	*Cicer arietinum* L. subsp. *arietinum*	Herb	Introduced	(POWO, 2023)
48.	*Crotalaria incana* subsp. *incana*	Herb	Introduced	(POWO, 2023)
49.	*Crotalaria berteroana* var. *berteroana*	Herb	Native	(POWO, 2023)
50.	*Crotalaria juncea* L.	Herb	Native	(POWO, 2023)
51.	*Crotalaria khasiana* Balansa ex Thoth. & A. A. Ansari	Herb	Native	(POWO, 2023)
52.	*Crotalaria laburnifolia* subsp. *laburnifolia*	Shrub	Native	(POWO, 2023)
53.	*Crotalaria leioloba* Bartl.	Herb	Native	(POWO, 2023)
54.	*Crotalaria medicaginea* Lam.	Herb	Native	(POWO, 2023)
55.	*Crotalaria medicaginea* var. *medicaginea*	Herb	Native	(POWO, 2023)
56.	*Crotalaria pallida* var. *pallida*	Herb	Native	(POWO, 2023)
57.	*Crotalaria prostrata* var. *prostrata*	Herb	Native	(POWO, 2023)

58.	*Crotalaria retusa* var. *retusa*	Herb	Native	(POWO, 2023)
59.	*Crotalaria saltiana* Andrews	Herb	Introduced	(POWO, 2023)
60.	*Crotalaria sessiliflora* subsp. *sessiliflora*	Herb	Native	(POWO, 2023)
61.	*Cynometra ramiflora* L. var. *ramiflora*	Tree	Native	(POWO, 2023)
62.	*Dalbergia cana* var. *cana*	Tree	Native	(POWO, 2023)
63.	*Dalbergia cana* Graham ex Kurz	Tree	Native	(POWO, 2023)
64.	*Dalbergia cana* var. *kurzii* (Prain) Niyomdham	Tree	Native	(POWO, 2023)
65.	*Dalbergia cultrata* T.S.Ralph	Tree	Native	(POWO, 2023)
66.	*Dalbergia horrida* var. *horrida*	Climber	Native	(POWO, 2023)
67.	*Dalbergia lanceolaria* subsp. *lanceolaria*	Tree	Native	(POWO, 2023)
68.	*Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth.	Tree	Native	(POWO, 2023)
69.	*Dalbergia melanoxylon* Guill. & Perr.	Tree	Introduced	(POWO, 2023)
70.	*Dalbergia ovata* var. *obtusifolia* Baker	Tree	Native	(POWO, 2023)
71.	*Dalbergia ovata* var. *ovata*	Tree	Native	(POWO, 2023)
72.	*Dalbergia pinnata* var. *pinnata*	Climber	Native	(POWO, 2023)
73.	*Dalbergia rubiginosa* Roxb.	Climber	Native	(POWO, 2023)
74.	*Dalbergia velutina* var. *velutina*	Climber	Native	(POWO, 2023)
75.	*Dendrolobium triangulare* subsp. *triangulare*	Shrub	Native	(POWO, 2023)
76.	*Derris elegans* Benth.	Climber	Native	(POWO, 2023)
77.	*Derris elegans* var. *elegans*	Climber	Native	(POWO, 2023)
78.	*Derris montana* Benth.	Climber	Native	(POWO, 2023)
79.	*Derris taiwaniana* (Hayata) Z. Q. Song	Climber	Native	(POWO, 2023)
80.	*Desmanthus virgatus* (L.) Willd.	Shrub	Introduced	(POWO, 2023)
81.	*Dichrostachys cinerea* (L.) Wight & Arn.	Shrub or Tree	Introduced	(POWO, 2023)
82.	*Dichrostachys cinerea* (L.) Wight & Arn. subsp. *cinerea*	Shrub or Tree	Introduced	(POWO, 2023)
83.	*Dolichos trilobus* L.	Climber	Native	(POWO, 2023)
84.	*Dolichos trilobus* L. subsp. *trilobus*	Climber	Native	(POWO, 2023)
85.	*Dumasia villosa* DC.	Climber	Native	(POWO, 2023)
86.	*Dumasia villosa* DC. subsp. *villosa*	Climber	Native	(POWO, 2023)
87.	*Dysolobium dasycarpum* (Miq.) I.M.Turner	Climber	Native	(POWO, 2023)
88.	*Dysolobium pilosum* (J.G.Klein ex Willd.) Maréchal	Climber	Native	(POWO, 2023)
89.	*Endosamara racemosa* (Roxb.) R.Geesink	Climber	Native	(POWO, 2023)
90.	*Entada rheedei* Spreng. subsp. *rheedei*	Climber	Native	(POWO, 2023)
91.	*Entada rheedei* subsp. *sinohimalensis* (Grierson & D. G. Long) Panigrahi	Climber	Native	(POWO, 2023)
92.	*Flemingia lineata* var. *lineata*	Herb	Native	(POWO, 2023)
93.	*Flemingia prostrata* Roxb.Junior ex Roxb.	Herb	Native	(POWO, 2023)
94.	*Flemingia semialata* Roxb. ex W.T.Aiton	Shrub	Native	(POWO, 2023)
95.	*Flemingia wallichii* Wight & Arn.	Shrub	Native	(POWO, 2023)
96.	*Galactia striata* (Jacq.) Urb.	Climber	Native	(POWO, 2023)
97.	*Galactia striata* var. *villosa* (Wight & Arn.) Verdc.	Climber	Native	(POWO, 2023)
98.	*Geissaspis cristata* Wight & Arn. var. *cristata*	Climber	Native	(POWO, 2023)
99.	*Glycine max* (L.) Merr. subsp. *max*	Climber	Introduced	(POWO, 2023)
100.	*Glycyrrhiza glabra* L.	Herb	Introduced	(POWO, 2023)
101.	*Grona heterocarpos* subsp. *heterocarpos*	Shrub	Native	(POWO, 2023)
102.	*Hardwickia binata* Roxb.	Tree	Native	(POWO, 2023)
103.	*Huangtcia renifolia* (L.) H. Ohashi & K. Ohashi	Herb	Native	(POWO, 2023)
104.	*Huchimingia piscidia* (Roxb.) Z. Q. Song	Tree	Native	(POWO, 2023)
105.	*Hultholia mimosoides* (Lam.) Gagnon & G.P.Lewis	Climber	Native	(POWO, 2023)
106.	*Imbralyx leucanthus* (Kurz) Z.Q.Song	Tree	Native	(POWO, 2023)
107.	*Imbralyx leucanthus* (Kurz) Z.Q.Song var. *leucanthus*	Tree	Native	(POWO, 2023)
108.	*Indigofera astragalina* DC.	Herb	Native	(POWO, 2023)
109.	*Indigofera cassioides* Rottler ex DC.	Shrub	Native	(POWO, 2023)
110.	*Indigofera colutea* var. *colutea*	Herb	Native	(POWO, 2023)
111.	*Indigofera dosua* var. *dosua*	Shrub	Native	(POWO, 2023)
112.	*Indigofera hendecaphylla* Jacq.	Herb	Native	(POWO, 2023)
113.	*Indigofera lacei* Craib	Shrub	Native	(POWO, 2023)
114.	*Indigofera oblongifolia* Forssk.	Herb	Native	(POWO, 2023)
115.	*Indigofera tinctoria* var. *tinctoria*	Shrub	Native	(POWO, 2023)
116.	*Indigofera trifoliata* subsp. *trifoliata*	Herb	Native	(POWO, 2023)
117.	*Indigofera trita* var. *trita*	Climber	Native	(POWO, 2023)
118.	*Intsia palembanica* Miq. Fl. Ned. Ind.	Tree	Native	(POWO, 2023)
119.	*Leptodesmia microphylla* (Thunb.) H.Ohashi & K.Ohashi	Shrub	Native	(POWO, 2023)

	var. *microphylla*			
120.	*Leucaena leucocephala* (Lam.) de Wit subsp. *leucocephala*	Shrub or Tree	Introduced	(POWO, 2023)
121.	*Lupinus albus* subsp. *albus*	Herb	Introudced	(POWO, 2023)
122.	*Lupinus caudatus* Kellogg	Herb	Introudced	(POWO, 2023)
123.	*Lupinus caudatus* Kellogg subsp. *caudatus*	Herb	Introudced	(POWO, 2023)
124.	*Lupinus luteus* L.	Herb	Introudced	(POWO, 2023)
125.	*Lupinus polyphyllus* Lindl. subsp. *polyphyllus*	Herb	Introudced	(POWO, 2023)
126.	*Macrotyloma uniflorum* (Lam.) Verdc. var. *uniflorum*	Climber	Native	(POWO, 2023)
127.	*Medicago sativa* subsp. *sativa*	Herb	Introudced	(POWO, 2023)
128.	*Mezoneuron furfuraceum* Prain	Climber	Native	(POWO, 2023)
129.	*Millettia brandisiana* Kurz	Tree	Native	(POWO, 2023)
130.	*Millettia macrostachya* Collett & Hemsl.	Tree	Native	(POWO, 2023)
131.	*Millettia pubinervis* Kurz	Tree	Native	(POWO, 2023)
132.	*Millettia pulchra* var. *pulchra*	Climber	Native	(POWO, 2023)
133.	*Millettia sericea* (Vent.) Wight & Arn. ex Hassk.	Climber	Native	(POWO, 2023)
134.	*Mimosa pigra* var. *pigra*	Shrub	Introduced	(POWO, 2023)
135.	*Mimosa pudica* var. *pudica*	Herb	Introduced	(POWO, 2023)
136.	*Mucuna gigantea* subsp. *gigantea*	Climber	Native	(POWO, 2023)
137.	*Mucuna hainanensis* Hayata	Climber	Native	(POWO, 2023)
138.	*Neltuma juliflora* (Sw.) Raf.	Shrub or Tree	Introduced	(POWO, 2023)
139.	*Neltuma juliflora* (Sw.) Raf. var. *juliflora*	Shrub or Tree	Introduced	(POWO, 2023)
140.	*Neustanthus phaseoloides* var. *subspicatus* (Benth.) A.N.Egan & B.Pan	Climber	Native	(POWO, 2023)
141.	*Parkia biglandulosa* Wight & Arn.	Tree	Native	(POWO, 2023)
142.	*Parochetus communis* Buch.-Ham. ex D.Don	Herb	Native	(POWO, 2023)
143.	*Phanera glabrifolia* Benth. var. *glabrifolia*	Climber	Native	(POWO, 2023)
144.	*Phanera meeboldii* (Craib) Thoth.	Climber	Native	(POWO, 2023)
145.	*Phanera ornata* var. *kerrii* (Gagnep.) Bandyop.	Climber	Native	(POWO, 2023)
146.	*Phyllodium pulchellum* (L.) Desv. var. *pulchellum*	Shrub	Native	(POWO, 2023)
147.	*Polhillides velutina* (Willd.) H.Ohashi & K.Ohashi subsp. *velutina*	Herb	Native	(POWO, 2023)
148.	*Polhillides velutina* subsp. *longibracteata* (Schindl.) H.Ohashi & K.Ohashi	Shrub	Native	(POWO, 2023)
149.	*Pongamia pinnata* (L.) Pierre var. *pinnata*	Shrub or Tree	Native	(POWO, 2023)
150.	*Pseudalbizzia niopoides* (Spruce ex Benth.) E.J.M.Koenen & Duno	Tree	Introduced	(POWO, 2023)
151.	*Pseudalbizzia niopoides* (Spruce ex Benth.) E.J.M.Koenen & Duno var. *niopoides*	Tree	Introduced	(POWO, 2023)
152.	*Pseudarthria viscida* (L.) Wight & Arn.	Shrub	Native	(POWO, 2023)
153.	*Pterocarpus dalbergioides* Roxb. ex DC.	Tree	Introduced	(POWO, 2023)
154.	*Pterocarpus marsupium* Roxb. subsp. *marsupium*	Tree	Native	(POWO, 2023)
155.	*Pterolobium hexapetalum* (Roth) Santapau & Wagh	Climber	Native	(POWO, 2023)
156.	*Pueraria montana* (Lour.) Merr.	Climber	Native	(POWO, 2023)
157.	*Rhynchosia aurea* (Willd.) DC.	Climber	Native	(POWO, 2023)
158.	*Rhynchosia minima* (L.) DC. var. *minima*	Climber	Native	(POWO, 2023)
159.	*Saraca cauliflora* Baker	Tree	Introduced	(POWO, 2023)
160.	*Senegalia donaldi* (Haines) Ragup.	Tree	Native	(POWO, 2023)
161.	*Senegalia gageana* (Craib) Maslin	Climber	Native	(POWO, 2023)
162.	*Senegalia megaladena* (Desv.) Maslin	Climber	Native	(POWO, 2023)
163.	*Senegalia megaladena* (Desv.) Maslin, Seigler & Ebinger var. *megaladena*	Climber	Native	(POWO, 2023)
164.	*Senegalia polyacantha* (Willd.) Seigler & Ebinger subsp. *polyacantha*	Tree	Native	(POWO, 2023)
165.	*Senegalia recurva* (Benth.) Seigler & Ebinger	Shrub or Tree	Introduced	(POWO, 2023)
166.	*Senna auriculata* (L.) Roxb.	Shrub or Tree	Native	(POWO, 2023)
167.	*Senna hirsuta* (L.) H.S.Irwin & Barneby var. *hirsuta*	Shrub	Introduced	(POWO, 2023)
168.	*Senna sulfurea* (DC. ex Collad.) H.S.Irwin & Barneby	Shrub or Tree	Native	(POWO, 2023)
169.	*Sesbania bispinosa* (Jacq.) W.Wight var. *bispinosa*	Herb	Native	(POWO, 2023)
170.	*Sesbania cannabina* (Retz.) Poir. var. *cannabina*	Herb	Native	(POWO, 2023)
171.	*Sesbania sesban* (L.) Merr. subsp. *sesban*	Shrub	Native	(POWO, 2023)
172.	*Sesbania uliginosa* (Roxb.) G.Don	Herb	Native	(POWO, 2023)
173.	*Sindora siamensis* Teijsm. ex Miq. var. *siamensis*	Tree	Native	(POWO, 2023)
174.	*Sohmaea laxiflora* (DC.) H.Ohashi & K.Ohashi	Shrub	Native	(POWO, 2023)

	subsp. *laxiflora*			
175.	*Sohmaea teres* (Wall. ex Benth.) H.Ohashi & K.Ohashi	Shrub	Native	(POWO, 2023)
176.	*Sophora benthamii* Steenis	Shrub	Native	(POWO, 2023)
177.	*Sophora tomentosa* L.	Herb	Native	(POWO, 2023)
178.	*Stylosanthes guianensis* (Aubl.) Sw. subsp. *guianensis*	Shrub	Introduced	(POWO, 2023)
179.	*Tephrosia purpurea* (L.) Pers. subsp. *purpurea*	Herb	Native	(POWO, 2023)
180.	*Tephrosia villosa* (L.) Pers. subsp. *villosa*	Herb	Native	(POWO, 2023)
181.	*Teramnus labialis* (L.f.) Spreng. subsp. *labialis*	Climber	Native	(POWO, 2023)
182.	*Ticanto crista* (L.) R.Clark & Gagnon	Climber	Native	(POWO, 2023)
183.	*Trifolium repens* L.	Herb	Introduced	(POWO, 2023)
184.	*Trifolium repens* L. subsp. *repens*	Herb	Introduced	(POWO, 2023)
185.	*Trigonella glabra* Thunb.	Herb	Native	(POWO, 2023)
186.	*Ulex europaeus* L. subsp. *europaeus*	Shrub	Introduced	(POWO, 2023)
187.	*Uraria lagopus* DC. var. *lagopus*	Shrub	Native	(POWO, 2023)
188.	*Vachellia farnesiana* (L.) Wight & Arn. var. *farnesiana*	Tree	Introduced	(POWO, 2023)
189.	*Vachellia leucophloea* (Roxb.) Maslin	Shrub or Tree	Native	(POWO, 2023)
190.	*Vachellia leucophloea* (Roxb.) Maslin	Shrub or Tree	Native	(POWO, 2023)
191.	*Vicia lens* (L.) Coss. & Germ. subsp. *lens*	Climber	Introduced	(POWO, 2023)
192.	*Vicia sativa* L. subsp. *sativa*	Climber	Native	(POWO, 2023)
193.	*Vigna glabrescens* Maréchal, Mascherpa & Stainier	Climber	Native	(POWO, 2023)
194.	*Vigna radiata* (L.) R.Wilczek var. *radiata*	Climber	Native	(POWO, 2023)
195.	*Vigna radiata* var. *sublobata* (Roxb.) Verdc.	Climber	Native	(POWO, 2023)
196.	*Vigna vexillata* (L.) A. Rich. var. *vexillata*	Climber	Native	(POWO, 2023)
197.	*Xylia xylocarpa* var. *kerrii* (Craib & Hutch.) I.C.Nielsen	Tree	Native	(POWO, 2023)
198.	*Zapoteca portoricensis* (Jacq.) H.M.Hern. subsp. *portoricensis*	Climber	Introduced	(POWO, 2023)

Table 2. Represents the number of species in the Family Fabaceae according to genus

Sl	Genus	Number of species (n_i)	(n_i-1)	$n_i(n_i-1)$
1.	*Crotalaria*	40	39	1560
2.	*Dalbergia*	34	33	1122
3.	*Indigofera*	25	24	600
4.	*Vigna*	17	16	272
5.	*Flemingia*	14	13	182
6.	*Senegalia*	14	13	182
7.	*Senna*	14	13	182
8.	*Alysicarpus*	13	12	156
9.	*Millettia*	13	12	156
10.	*Albizia*	12	11	132
11.	*Derris*	12	11	132
12.	*Bauhinia*	11	10	110
13.	*Mucuna*	11	10	110
14.	*Cassia*	10	9	902
15.	*Mimosa*	10	9	90
16.	*Phanera*	10	9	90
17.	*Chamaecrista*	9	8	72
18.	*Sesbania*	9	8	72
19.	*Uraria*	9	8	72
20.	*Vachellia*	9	8	72
21.	*Vicia*	9	8	72
22.	*Calliandra*	8	8	64
23.	*Lupinus*	8	8	64
24.	*Cajanus*	7	6	42
25.	*Canavalia*	7	6	42
26.	*Erythrina*	7	6	42
27.	*Pueraria*	7	6	42
28.	*Rhynchosia*	7	6	42
29.	*Tephrosia*	7	6	42
30.	*Abrus*	6	5	30
31.	*Pterocarpus*	6	5	30
32.	*Acacia*	5	4	20
33.	*Aeschynomene*	5	4	20

34.	*Dysolobium*	5	4	20
35.	*Grona*	5	4	20
36.	*Saraca*	5	4	20
37.	*Trigonella*	5	4	20
38.	*Christia*	4	3	12
39.	*Cynometra*	4	3	12
40.	*Entada*	4	3	12
41.	*Intsia*	4	3	12
42.	*Lablab*	4	3	12
43.	*Lathyrus*	4	3	12
44.	*Medicago*	4	3	12
45.	*Mezoneuron*	4	3	12
46.	*Teramnus*	4	3	12
47.	*Archidendron*	3	2	6
48.	*Brownea*	3	2	6
49.	*Butea*	3	2	6
50.	*Campylotropis*	3	2	6
51.	*Dendrolobium*	3	2	6
52.	*Leptodesmia*	3	2	6
53.	*Melilotus*	3	2	6
54.	*Phaseolus*	3	2	6
55.	*Pithecellobium*	3	2	6
56.	*Polhillides*	3	2	6
57.	*Sindora*	3	2	6
58.	*Sohmaea*	3	2	6
59.	*Sophora*	3	2	6
60.	*Spatholobus*	3	2	6
61.	*Tadehagi*	3	2	6
62.	*Adenanthera*	2	1	2
63.	*Aganope*	2	1	2
64.	*Biancaea*	2	1	2
65.	*Brachypterum*	2	1	2
66.	*Caesalpinia*	2	1	2
67.	*Cicer*	2	1	2
68.	*Codariocalyx*	2	1	2
69.	*Desmodium*	2	1	2
70.	*Dichrostachys*	2	1	2
71.	*Dolichos*	2	1	2
72.	*Dumasia*	2	1	2
73.	*Dunbaria*	2	1	2
74.	*Galactia*	2	1	2
75.	*Geissaspis*	2	1	2
76.	*Glycine*	2	1	2
77.	*Huangtcia*	2	1	2
78.	*Imbralyx*	2	1	2
79.	*Leucaena*	2	1	2
80.	*Macrotyloma*	2	1	2
81.	*Moullava*	2	1	2
82.	*Neltuma*	2	1	2
83.	*Neptunia*	2	1	2
84.	*Neustanthus*	2	1	2
85.	*Parkia*	2	1	2
86.	*Phyllodium*	2	1	2
87.	*Pongamia*	2	1	2
88.	*Pseudalbizzia*	2	1	2
89.	*Smithia*	2	1	2
90.	*Stylosanthes*	2	1	2
91.	*Trifolium*	2	1	2
92.	*Ulex*	2	1	2
93.	*Zapoteca*	2	1	2
94.	*Zornia*	2	1	2
95.	Other 54 genera	1	0	0
96.				$\sum n_i(n_i-1) = 7162$

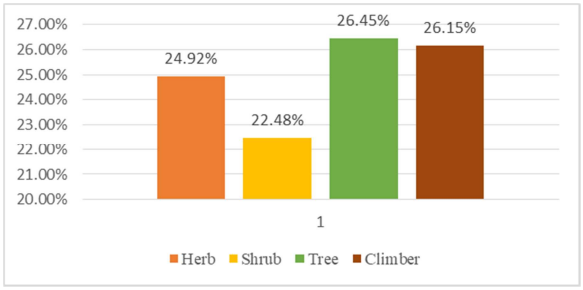

Fig. 1. Display the percentage of life forms in the family Fabaceae

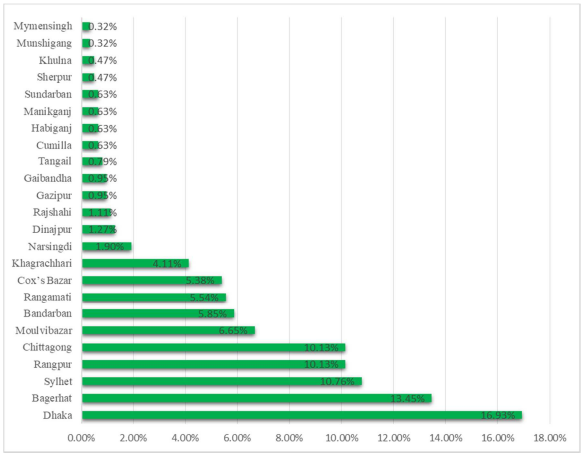

Fig. 2. Geographical distribution of species showing percentage of species in each chorotype in the family Fabaceae

Simpson's Diversity Index for the family Fabaceae was calculated as 0.98, indicating high species diversity and evenness (Salisu *et al.*, 2021). This high diversity reflects the ecological importance and adaptability of Fabaceae species in various ecosystems, ranging from forested areas to agricultural landscapes. The even distribution of species across genera highlights the family's functional significance in the country's biodiversity.

The results of the species' geographic distribution revealed that the Dhaka region is home to 16.93% species of all species. 13.45% species belong to Bagerhat region, 10.76% species belong to Sylhet, 10.13% species belong to Rangpur and Chittagong region (Fig. 2).

The geographical distribution indicates that the highest diversity is concentrated in regions with favorable climatic and ecological conditions, such as forested areas and wetland ecosystems.

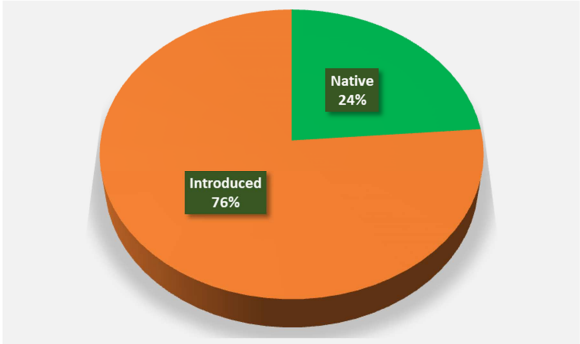

Fig. 3. Native and introduced plant species as a percentage of total flora

Among the 606 species, the native flora dominated, with 76% of the species (Fig. 3). The introduced species were primarily herbaceous crops like *Glycine max* and *Cicer arietinum*, reflecting their agricultural importance.

DISCUSSION

198 new additions to flora, significant finding not only enriches the catalog of plant species in the region but also underscores the ecological importance of the Fabaceae family in supporting biodiversity, soil health, and sustainable agriculture. These newly recorded species open new avenues for conservation efforts, scientific research, and the exploration of their potential economic and medicinal value. This discovery marks a pivotal advancement in the field of plant taxonomy and biodiversity studies in Bangladesh (Uddin *et al.*, 2023). The Fabaceae family plays a pivotal role in ecosystem functioning, particularly through nitrogen fixation, which enhances soil fertility and supports plant community dynamics (Taylor *et al.*, 2020). The high representation of native species in this study underscores the ecological significance of Fabaceae in sustaining biodiversity in Bangladesh. Additionally, the large number of tree and climber species indicates their importance in forest ecosystems, where they contribute to habitat structure and carbon sequestration.

The Chittagong and Sylhet regions, with their favorable topography and climatic conditions, emerged as biodiversity hotspots for Fabaceae

species. These regions are characterized by tropical and subtropical forests that provide optimal conditions for leguminous plants. The lower species richness in some districts, such as Munshigang and Mymensingh, could be attributed to less favorable environmental conditions or anthropogenic pressures, such as deforestation and land-use changes (Rahman, 2015). The findings highlight the need for conservation efforts to protect Fabaceae diversity, particularly in regions like Chittagong and Sylhet, where species richness is high. Strategies such as habitat restoration, agroforestry practices, and sustainable land-use management could help mitigate threats to these species. Furthermore, conservation efforts should prioritize vulnerable species to maintain the ecological balance and biodiversity of Bangladesh.

The diversity of Fabaceae in Bangladesh has significant agricultural and economic implications. Species like *Cicer arietinum* (chickpea), *Vigna radiata* (mung bean), and *Glycine max* (soybean) are essential crops, providing protein-rich food and supporting rural livelihoods. Other species, such as *Albizia* sp. and *Acacia* sp., are valuable for timber and agroforestry applications, while ornamental species like *Cassia fistula* enhance urban landscapes. This study relied on secondary data and field surveys, which may not fully capture recent changes in species distribution due to habitat loss or climate change. Integrating molecular techniques and long-term ecological monitoring in future research would provide more comprehensive insights into the taxonomy, population dynamics, and conservation status of Fabaceae species in Bangladesh. In conclusion, the study underscores the ecological and economic importance of the Fabaceae family in Bangladesh, highlighting the need for targeted conservation efforts and sustainable utilization of these resources. By providing a comprehensive inventory and analysis of Fabaceae species, this research contributes to biodiversity conservation planning and promotes the sustainable management of plant resources in the region.

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