

Assessment of Floral Diversity of Rangbhang-Bhainsegaunda, Syangja district

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Research Article

Keywords: Exploration, Documentation, Identification, Sub-tropical Forest, Gandaki province

Posted Date: October 14th, 2025

DOI: <https://doi.org/10.21203/rs.3.rs-7834787/v1>

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Additional Declarations: The authors declare no competing interests.

Abstract

Rangbhang- Bhaisegaunda located in the junction of Biruwa Rural Municipality and Putalibazar Metropolitan City–2, Syangja district of Gandaki province of Nepal is enriched with diverse biodiversity. The two different aspects of Rangbhang were studied from north to south covering the altitudinal range of the sub-tropical region at 1050m to 1591m from the sea level of Nepal. A total of 199 species of phanerogams and cryptogams (Pteridophytes and Bryophytes) plants categorized by 175 genera and 77 families were reported. Among this total, 185 species of phanerogams plants categorized under 161 genera from 69 families were reported in this study. *Ficus* with eight species was the dominant genera succeeded by *Coelogyne* and *Pteris* each with three species. The richest family was found to be Orchidaceae with 16 species succeeded by Poaceae with 15 species. Herbaceous life form was dominant with 108 species succeeded by trees with 48 species, shrubs with 35 species and climbers with eight species. One species of gymnosperm has been recorded i.e. *Pinus roxburghii* Sarg. The species were also collected for making herbarium. The wide distribution of flora in this region was studied and identified by the primary and secondary data using books, various literature, expert supervision, and web portals for authentic verification the herbarium was checked with ASCOL herbarium. Anthropogenic disturbances and natural disturbances have some threatening issues for the biodiversity conservation of this habitat. It is important to take special priority for preserving the identical collection of this biodiversity richness in this place along with further continuous study of the flora of this biodiversity-rich place. The main objective of this research is to study plant species available between elevations of 1050-1591m. Furthermore, this study provides the present condition of flora in the study area.

INTRODUCTION

BACKGROUND

The floristic research is a record of every species of plant found in a specific geographic area (Simpson, 2006). Floristic diversity of an area is directly linked to the kinds of life-forms and functional groups of plants found there. This includes classifying plants as woody or herbaceous and as monocots or dicots. Further the presence and variety of groups like pteridophytes, bryophytes, lichens and orchids play a role in shaping this diversity (Peet, 1978; Bhattarai and Veetas, 2003; Jacobsen and Jacobsen, 1989; Bhattarai et al., 2004a; Kluge et al., 2006; Grau et al., 2007; Baniya et al., 2010; Acharya et al., 2011). The floristic diversity of the local or regional area must be studied because it is essential for several reasons, including the counting of plants, updating scientific nomenclature, recording changes in ecological conditions, adding herbarium specimens to the herbaria already in place, and figuring out what kinds of flora resources need to be managed and where they are found (Raghubanshi & Singh, 2003; Chalise et al., 2018). The vast and distinctive floristic diversity of Nepal was first explored and documented as early as 1802, by FB Hamilton from 1802 to 1803, N Wallich, from 1820 to 1821 and D Don during 1825.

The country covers about 0.15% of global land area, but harbors 3.2% of the world's flora (Kharel and Dhungana, 2018). The country's 118 Ecosystems harbor over 2% of the flowering plants, 3% of the pteridophytes and 6% of the bryophytes in the world's flora (Paudel *et al.*, 2012). Nepal is a gallery of angiosperms counting 5309 species, gymnosperms counting 26 species, bryophytes counting 1213 species with pteridophytes counting 583 species out of which 1614 have been recognized as MAPs- medicinal and aromatic plants (Rajbhandary *et al.*, 2020). Every species, or taxonomic unit, whose distribution is limited to a single, constrained geographic area is referred to as an endemism (Good, 1974; Gaston, 1991). The department of plant resources under Nepal's Ministry of Forests and Environment, in an updated information reported that Nepal is home to 312 endemic species of flowering plants. These species are distributed across 46 families and 126 genera (Rajbhandari and Rai, 2017; Tiwari *et al.*, 2019). The IUCN Red List guidelines and criteria consist of eight categories viz. extinct (EX), extinct in the wild (EW), critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC) or data deficient (DD) established by IUCN standards and Petition Committee (IUCN, 2019; Ronsted *et al.*, 2022). Nepal officially joined the party on June 18, 1975, and the agreement came into effect on September 16, 1975 (Joshi *et al.*, 2017). In Nepal, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) provides protection for several plant species.

Research frequently indicates a mid-altitude peak in species richness (Rahbek, 2005). Locally in Nepal, this pattern has been specifically studied in relation to vascular plant and fern species, with analysis focusing on how their richness varies across different elevations. The mid-hill regions of Nepal are home to a wide variety of plant species, with this range (1500-2500m) having the highest species richness (Vetaas & Grytness, 2002). Therefore, comprehensive floristic inventory and ecological exploration are crucial to assessing the effectiveness of the natural forest's conservation efforts to maintain biological equilibrium and meet forest requirements (Dangol & Shivakoti, 2001).

This study aims to enumerate mostly vascular plants along with other surrounding plants present around the hills of Rangbhang- Bhaiseegaunda located in the Syangja district. The identification of some plant species was made using advanced intelligence technology.

MATERIALS AND METHODS

STUDY AREA

Syangja district lies in Gandaki province and is one of the seventy-seven districts of Nepal. The district, with Syangja bazaar (a small town) as its district headquarters, covers an area of 1,164 km² (449 sq.m) and has a population of 289,148. It lies in the hilly region at an altitude ranging from about 300 meters along the banks of Kaligandaki river up to a couple of thousand meters above sea level. It lies at about latitude 28°4'6" North and longitude 83°52'0" East.

The study is conducted in junction of Biruwa Rural Municipality and Putalibazar Metropolitan City–2, between Rangbhang and Bhainsegaunda. It lies at an altitude between 1050m to 1591m. It includes extremely steep and rocky slopes to plain areas with various terraces along the terrain. The climate of this area is subtropical with climatic variations. The gradient is vertical and steep, favoring a large ecosystem diversity. The vegetation of the forest is mixed, which encompasses Sal Forest at a lower altitude with *Schima-Castanopsis* plant species and *Rhododendron* at the apex.

FIELD OBSERVATION AND PLANT COLLECTION

Preliminary study of finding study sites, selecting sampling of the plant species along with the information of local flora were carried out during April 7-10, 2024. The second visit was conducted during May 7-10, 2025, and all the necessary data were collected. The plant was identified by direct observation. The local name was noted along with the photograph of the plant. The herb was collected by the whole plant body but only a part of the plant was collected in the case of shrubs and trees along with required field notes. The Specimen's collection was based on ethical values. Herbarium was pressed with herbaria including cardboard, newspaper and blotting paper sheets following the methods of Bridson and Forman (2014). It was finally dried and mounted on an herbarium sheet of standard size with a glue stick and labeled then deposited in ASCOL Herbarium. The two major community forests, Simrik Community Forest and Barahi Community Forest were taken into consideration wherever possible to observe the richness of the species besides the major areas of the study. Some of the species which are identified earlier were listed from the local correspondence. Further information was acquired through online information on herbaria viz. www.plants.jstor.org, www.floraofnepal.org, www.efloras.org, powo.science.kew.org, www.catalogueoflife.org, www.ipni.org, www.plantdatabase.kath.gov.np, www.herbaria.plants.ox.ac.uk, www.iplant.cn, www.worldfloraonline.org, www.jircas.go.jp, www.theplantlist.org, www.iucnredlist.org and so on.

PLANT IDENTIFICATION

The specimens were identified with the help of experts and authentic literature and the unidentified specimens were identified with the help of nomenclature and author citation of plant species followed by the International Plant Name Index ([https:// www.ipni.org/](https://www.ipni.org/)). The nomenclature of each species was validated after using the latest taxonomic literature (Press et al., 2000). The collected plant specimens were identified using relevant taxonomic literature: Hooker (1872-1897), Malla *et al.*, (1986), Press *et al.*, (2000), Raskoti (2009) and Akiyama et al., (2011). The collected data was analyzed using MS Excel. Plants with botanical names, habits, altitudinal range and families were listed on the sheet. For the nomenclature and author citation of plant species, and 'The Plant List' (www.theplantlist.org) were followed. The use of practical plant identification by James Cullen and plant identification terminology by James G. Harris & Melinda Woolf Harris was most approachable for most of the specimen identification. The families are based on APG III (2009).

RESULTS

The floristic diversity of the Rangbhang- Bhainsegaunda comprises 185 species of phanerogams, and 14 species of cryptogams categorized by 12 genera and 8 families. In the life form category herbaceous species were dominant with 108 species succeeded by trees with 48 species, shrubs with 35 species and climbers with eight species. The dominant was families were Orchidaceae (16 species) succeeded by Poaceae (15 species), Asteraceae (12 species), Moraceae (10 species), Rosaceae and Lamiaceae (nine species each), Rubiaceae (eight species), Fabaceae (seven species), Rutaceae (six species), Pteridaceae (five species), Fagaceae, Malvaceae, Solanaceae, Urticaceae and Zingiberaceae (four species each). In families based on genera, the dominant genus was *Ficus* with eight species succeeded by *Coelogyne* with three species, *Bambusa*, *Buddleja*, *Castanopsis*, *Citrus*, *Datura*, *Elatostema*, *Hypericum*, *Prunus*, *Pteris*, *Rubus* and *Solanum* each with two species while rest of the genera are monotypic or containing each single species (Table 1).

Table 1. List of recorded Plant species with family, habitat and elevation.

S.N.	Family	Scientific Name	Life form	Altitudinal range	IUCN List
1	Acanthaceae	<i>Justicia adhatoda</i> L.	Shrub		LC
2	Acanthaceae	<i>Lepidagathis incurva</i> Buch.-Ham. ex D. Don	Herb		
3	Actinidiaceae	<i>Saurauia napaulensis</i> DC.	Tree		LC
4	Amaranthaceae	<i>Celosia argentea</i> L.	Herb	500-1600	LC
5	Amaryllidaceae	<i>Allium tuberosum</i> Rottler ex Spreng.	Herb		
6	Amaryllidaceae	<i>Zephyranthes carinata</i> Herb.	Herb		
7	Anacardiaceae	<i>Mangifera indica</i> L.	Tree		LC
8	Anacardiaceae	<i>Spondias pinnata</i> (L.f.) Kurz	Tree	300-1400	LC
9	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	Herb	500-2100	LC
10	Apocynaceae	<i>Holarrhena pubescens</i> Wall. ex G.Don	Shrub	100-1500	LC
11	Apocynaceae	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Climber	150-900	
12	Araliaceae	<i>Brassaiaopsis hainla</i> (Buch.-Ham.) Seem.	Tree	1000-1900	
13	Araliaceae	<i>Macropanax undulatus</i> (Wall. ex G.Don) Seem.	Tree	400-2200	
14	Asparagaceae	<i>Asparagus racemosus</i> Willd.	Shrub		
15	Asteraceae	<i>Acmeilla calva</i> (DC.) R.K.Jansen	Herb	1000-1900	
16	Asteraceae	<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	Herb	850-2500	
17	Asteraceae	<i>Ageratum conyzoides</i> L.	Herb		LC
18	Asteraceae	<i>Artemisia indica</i> Willd.	Herb		
19	Asteraceae	<i>Bidens pilosa</i> L.	Herb		
20	Asteraceae	<i>Conyza sumatrensis</i> (S.F.Blake) Pruski & G.Sancho	Herb		
21	Asteraceae	<i>Cyanthillium cinereum</i> (L.) H.Rob.	Herb	100-2300	
22	Asteraceae	<i>Duhaldea cappa</i> (Buch.-Ham. ex D.Don) Pruski & Anderb.	Shrub	1000-2500	

23	Asteraceae	<i>Pseudognaphalium affine</i> (D.Don) Anderb.	Herb		
24	Asteraceae	<i>Tagetes erecta</i> L.	Herb	900-2000	
25	Asteraceae	<i>Taraxacum</i> sect. <i>Taraxacum</i> F.H.Wigg.	Herb		
26	Asteraceae	<i>Youngia japonica</i> (L.) DC.	Herb		
27	Balsaminaceae	<i>Impatiens bicornuta</i> Wall.	Herb		
28	Berberidaceae	<i>Berberis asiatica</i> Roxb. ex DC.	Shrub		
29	Bignoniaceae	<i>Oroxylum indicum</i> (L.) Kurz	Tree	400-1400	LC
30	Brassicaceae	<i>Capsella bursa-pastoris</i> (L.) Medik.	Herb	1400-4500	LC
31	Buxaceae	<i>Sarcococca wallichii</i> Stapf	Shrub		
32	Cannabaceae	<i>Cannabis sativa</i> L.	Herb		
33	Cannabaceae	<i>Trema orientale</i> (L.) Blume	Tree	1000-1200	LC
34	Caryophyllaceae	<i>Silene</i> sp	Herb		
35	Caryophyllaceae	<i>Stellaria media</i> (L.) Vill.	Herb		
36	Commelinaceae	<i>Commelina benghalensis</i> L.	Herb	900-1800	
37	Commelinaceae	<i>Commelina paludosa</i> Blume	Herb		
38	Cyatheaceae	<i>Alsophila spinulosa</i> Wall. Ex. Hook.	Herb	1534m	
39	Cyperaceae	<i>Cyperus albescens</i> (Steud.) Larridon & Govaerts	Herb	1490	
40	Dennstaedtiaceae	<i>Dennstaedtia bipinnata</i> (Cav.) Maxon	Herb	1413m	
41	Dennstaedtiaceae	<i>Pteridium aquilinum</i> (L.) Kuhn	Herb	1478m	LC
42	Dioscoreaceae	<i>Dioscorea bulbifera</i> L.	Climber		
43	Dryopteridaceae	<i>Dryopteris cochleata</i> (D.Don) C.Chr.	Herb	1510m	
44	Elaeagnaceae	<i>Elaeagnus infundibularis</i> Momiy.	Shrub	1500-2500	
45	Equisetaceae	<i>Equisetum ramosissimum</i> Desf.	Herb		LC
46	Ericaceae	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Shrub		LC
47	Ericaceae	<i>Rhododendron arboreum</i> Sm.	Tree		LC
48	Euphorbiaceae	<i>Falconeria insignis</i> Royle	Tree		
49	Euphorbiaceae	<i>Macaranga pustulata</i> King ex Hook.f.	Tree		

50	Fabaceae	<i>Aeschynomene indica</i> L.	Herb	200-1300	LC
51	Fabaceae	<i>Albizia procera</i> (Roxb.) Benth.	Tree		LC
52	Fabaceae	<i>Bauhinia variegata</i> L.	Tree		LC
53	Fabaceae	<i>Butea buteiformis</i> (Voigt) Grierson	Shrub	300-2000	
54	Fabaceae	<i>Codariocalyx motorius</i> (Houtt.) H.Ohashi	Shrub	1400	
55	Fabaceae	<i>Crotalaria ferruginea</i> Benth.	Shrub		
56	Fabaceae	<i>Mimosa pudica</i> L.	Herb	200-1200	LC
57	Fagaceae	<i>Castanea pumila</i> (L.) Mill.	Tree		LC
58	Fagaceae	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Tree		LC
59	Fagaceae	<i>Castanopsis tribuloides</i> (Sm.) A.DC.	Tree		LC
60	Fagaceae	<i>Quercus lanata</i> Sm.	Tree	1200	LC
61	Gentianaceae	<i>Gentiana capitata</i> Buch.-Ham. ex D.Don	Herb		
62	Hypericaceae	<i>Hypericum japonicum</i> Thunb.	Herb		
63	Hypericaceae	<i>Hypericum uralum</i> Buch.-Ham. ex D.Don	Herb	1200-3600	
64	Hypodematiaceae	<i>Leucostegia truncate</i> (D.Don) Fraser-Jenk.	Herb	1446m	
65	Iridaceae	<i>Crocus sativus</i> L.	Herb		
66	Juglandaceae	<i>Engelhardia spicata</i> Lechen ex Blume	Tree	400-2500	LC
67	Lamiaceae	<i>Ajuga macrosperma</i> Wall. ex Benth.	Herb	1200	
68	Lamiaceae	<i>Callicarpa arborea</i> Roxb.	Tree	300-1500	LC
69	Lamiaceae	<i>Clerodendrum infortunatum</i> L.	Shrub		LC
70	Lamiaceae	<i>Colebrookea oppositifolia</i> Sm.	Herb	250-1700	LC
71	Lamiaceae	<i>Micromeria biflora</i> (Buch.-Ham. ex D.Don) Benth.	Herb		
72	Lamiaceae	<i>Ocimum tenuiflorum</i> L.	Herb		
73	Lamiaceae	<i>Pogostemon glaber</i> Benth.	Herb	1400-1800	
74	Lamiaceae	<i>Scutellaria discolor</i> var. <i>discolor</i>	Herb	1000-1100	

75	Lamiaceae	<i>Vitex negundo</i> L.	Shrub	200-1400	LC
76	Lauraceae	<i>Cinnamomum tamala</i> (Buch.-Ham.) T.Nees & Eberm.	Tree		LC
77	Linaceae	<i>Reinwardtia indica</i> Dumort.	Herb	1400-1600	
78	Lindsaeaceae	<i>Odontosoria chinensis</i> (L.) J.Sm.	Herb	1446m	
79	Lythraceae	<i>Woodfordia fruticosa</i> (L.) Kurz	Shrub	200-1800	LC
80	Magnoliaceae	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Tree		LC
81	Malvaceae	<i>Malvaviscus arboreus</i> Dill. ex Cav.	Shrub		LC
82	Malvaceae	<i>Melochia corchorifolia</i> L.	Herb	200-1300	LC
83	Malvaceae	<i>Sida acuta</i> Burm.f.	Shrub	250-3700	
84	Malvaceae	<i>Urena lobata</i> L.	Herb	200-1300	LC
85	Mazaceae	<i>Mazus pumilus</i> (Burm.f.) Steenis	herb		
86	Melastomataceae	<i>Osbeckia stellata</i> Buch.-Ham. ex D.Don	Shrub	1300-2600	
87	Melastomataceae	<i>Melastoma malabathricum</i> L.	Shrub		
88	Menispermaceae	<i>Cissampelos pareira</i> L.	Climber	1400-1600	
89	Moraceae	<i>Artocarpus lacucha</i> Buch.-Ham.	Tree	1200	
90	Moraceae	<i>Ficus acuriculata</i> Lour.	Tree		
91	Moraceae	<i>Ficus benghalensis</i> L.	Tree	500-1200	
92	Moraceae	<i>Ficus hispida</i> L. f.	Tree	1400	LC
93	Moraceae	<i>Ficus lacor</i> Buch.-Ham.	Tree	1100-1500	
94	Moraceae	<i>Ficus religiosa</i> L.	Tree	150-1500	LC
95	Moraceae	<i>Ficus semicordata</i> Buch.-Ham. ex Sm.	Tree		LC
96	Moraceae	<i>Ficus subincisa</i> Buch.-Ham. ex Sm.	Herb	400-2400	LC
97	Moraceae	<i>Ficus virens</i> Aiton	Tree	500-1600	LC
98	Moraceae	<i>Morus alba</i> L.	Tree		LC
99	Myricaceae	<i>Myrica esculenta</i> Buch.-Ham. ex D.Don	Tree	1200-2300	
100	Myrtaceae	<i>Psidium guajava</i> L.	Tree	450-1200	LC
101	Orchidaceae	<i>Aerides odorata</i> Lour.	Herb	1000-1500	

102	Orchidaceae	<i>Anthogonium gracile</i> Wall. ex Lindl.	Herb	1200-2300	
103	Orchidaceae	<i>Coelogyne cristata</i> Lindl.	Herb	1000-2000	
104	Orchidaceae	<i>Coelogyne fuscescens</i> Lindl.	Herb		
105	Orchidaceae	<i>Coelogyne imbricata</i> (Hook.) Rchb.f.	Herb	1000-1800	
106	Orchidaceae	<i>Crepidium acuminatum</i> (D.Don) Szlach.	Herb	1400-1900	
107	Orchidaceae	<i>Cymbidium aloifolium</i> (L.) Sw.	Herb	900-1100	
108	Orchidaceae	<i>Dendrobium denudans</i> D.Don	Herb	1400-1500	
109	Orchidaceae	<i>Eria bractescens</i> Lindl.	Herb		
110	Orchidaceae	<i>Mycaranthes floribunda</i> (D.Don) S.C.Chen & J.J.Wood	Herb	1200	
111	Orchidaceae	<i>Oberonia pachyrachis</i> Rchb.f. ex Hook.f.	Herb	1360	
112	Orchidaceae	<i>Phalaenopsis taenialis</i> (Lindl.) Christenson & Pradhan	Herb	1400-1800	
113	Orchidaceae	<i>Pinalia apertiflora</i>	Herb	1400-1800	
114	Orchidaceae	<i>Rhynchostylis retusa</i> (L.) Blume	Herb	1340	
115	Orchidaceae	<i>Thunia alba</i> var. <i>alba</i>	Herb	1460	
116	Orchidaceae	<i>Vanda cristata</i> Wall. ex Lindl.	Herb	1300-1900	
117	Orobanchaceae	<i>Lindenbergia grandiflora</i> (Buch.-Ham. ex D. Don) Benth.	Herb		
118	Oxalidaceae	<i>Oxalis corniculata</i> L.	Herb		
119	Pinaceae	<i>Pinus roxburghii</i> Sarg.	Tree	1100-2100	LC
120	Poaceae	<i>Arundinella nepalensis</i> Trin.	Herb		LC
121	Poaceae	<i>Bambusa nutans</i> Wall. ex Munro	Herb	700-1700	
122	Poaceae	<i>Bambusa tulda</i> Roxb.	Herb		
123	Poaceae	<i>Chrysopogon zizanioides</i> (L.)	Herb		
124	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	Herb	100-2000	
125	Poaceae	<i>Digitaria violascens</i> Link	Herb		
126	Poaceae	<i>Drepanostachyum intermedium</i> (Munro) Keng f.	Herb		

127	Poaceae	<i>Eragrostis atrovirens</i> (Desf.) Trin. ex Steud.	Herb	1460	LC
128	Poaceae	<i>Imperata cylindrica</i> (L.) Raeusch.	Herb	200-1200	LC
129	Poaceae	<i>Lophatherum gracile</i> Brongn.	Herb	1490	
130	Poaceae	<i>Oplismenus compositus</i> (L.) P.Beauv.	Herb		LC
131	Poaceae	<i>Poa annua</i> L.	Herb		LC
132	Poaceae	<i>Pogonatherum paniceum</i> (Lam.) Hack.	Herb	1340	LC
133	Poaceae	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Herb	1500-2100	
134	Poaceae	<i>Vetiveria zizanoides</i> (Linn.)	Herb		
135	Polygalaceae	<i>Koenigia mollis</i>	Herb	1300-4000	
136	Polygalaceae	<i>Polygala arillata</i> Buch.-Ham. ex D.Don	Shrub	600-1800	LC
137	Polygonaceae	<i>Rumex nepalensis</i> Spreng.	Herb	1200-4200	
138	Polypodiaceae	<i>Loxogramme</i> (Blume) C.Presl	Herb	1407m	LC
139	Polypodiaceae	<i>Nephrolepis cordifolia</i> (L.) C.Presl	Herb	500-2000	
140	Primulaceae	<i>Maesa chisia</i> D. Don	Shrub		
141	Proteaceae	<i>Macadamia integrifolia</i> Maiden & Betche	Tree		VU
142	Pteridaceae	<i>Adiantum</i> L.	Herb	1407m	LC
143	Pteridaceae	<i>Hemionitis leptolepis</i> (Fraser-Jenk.) Christenh.	Herb	1000-3000	
144	Pteridaceae	<i>Pteris biaurita</i> L.	Herb	200-1500	
145	Pteridaceae	<i>Pteris terminalis</i> Wall. ex J.Agardh	Herb	600-2700	
146	Pteridaceae	<i>Pteris wallichiana</i> C.Agardh	Herb	1407m	
147	Rosaceae	<i>Neillia rubiflora</i> D.Don	Shrub	1480	
148	Rosaceae	<i>Potentilla indica</i> (Andrews) Th.Wolf	Herb	1000-2500	
149	Rosaceae	<i>Prunus cerasoides</i> Buch.-Ham. ex D.Don	Tree	1300-2400	LC
150	Rosaceae	<i>Prunus persica</i> (L.) Batsch	Tree		LC
151	Rosaceae	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don	Tree	750-2600	LC

152	Rosaceae	<i>Rosa chinensis</i> Jacq.	Shrub		
153	Rosaceae	<i>Rubus rugosus</i> Sm.	Shrub	1500	
154	Rosaceae	<i>Rubus ellipticus</i> Sm.	Shrub		LC
155	Rosaceae	<i>Rubus paniculatus</i> Sm.	Shrub		
156	Rubiaceae	<i>Argostemma verticillatum</i> Wall.	Herb	1490	
157	Rubiaceae	<i>Dimetia scandens</i> (Roxb.) R.J.Wang	Herb	400-1800	
158	Rubiaceae	<i>Mussaenda macrophylla</i> Wall.	Shrub	1460	
159	Rubiaceae	<i>Neanotis hirsuta</i> (L.f.) W.H.Lewis	Herb	1460	
160	Rubiaceae	<i>Oldenlandia corymbosa</i> L.	Herb	200-2400	LC
161	Rubiaceae	<i>Paederia foetida</i> L.	Climber	300-1800	
162	Rubiaceae	<i>Rubia wallichiana</i> Decne.	Climber	300-2600	
163	Rubiaceae	<i>Wendlandia coriacea</i> (Wall.) DC.	Tree	1400	
164	Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa	Tree	1200	NT
165	Rutaceae	<i>Boenninghausenia albiflora</i> (Hook.) Rchb. ex Meisn.	Shrub	1450	
166	Rutaceae	<i>Citrus medica</i> L.	Tree	700-1200	LC
167	Rutaceae	<i>Citrus reticulata</i> Blanco	Tree	600-1800	
168	Rutaceae	<i>Tetradium fraxinifolium</i> (Hook.) T.G.Hartley	Tree	1200-2100	LC
169	Rutaceae	<i>Zanthoxylum armatum</i> DC.	Shrub	1100-2500	LC
170	Salicaceae	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Tree		
171	Santalaceae	<i>Osyris lanceolata</i> Hochst. & Steud.	Shrub	1100-2600	LC
172	Sapindaceae	<i>Cardiospermum halicacabum</i> L.	Climber	900-1500	LC
173	Sapotaceae	<i>Diploknema butyracea</i> (Roxb.) H.J.Lam	Tree	200-1500	
174	Saururaceae	<i>Houttuynia cordata</i>	Herb	1300-2500	
175	Scrophulariaceae	<i>Buddleja asiatica</i> Lour.	Shrub	350-2000	LC
176	Scrophulariaceae	<i>Buddleja paniculata</i> Wall.	Tree		
177	Smilacaceae	<i>Smilax aspera</i> L.	Herb		LC
178	Smilacaceae	<i>Smilax zeylanica</i> L.	Climber	150-1500	

179	Solanaceae	<i>Datura stramonium</i> L.	Herb	200-2200	
180	Solanaceae	<i>Datura suaveolens</i> Humb. & Bonpl. ex Willd.	Shrub		EW
181	Solanaceae	<i>Solanum americanum</i> Mill.	Herb		
182	Solanaceae	<i>Solanum nigrum</i> L.	Herb	900-2900	
183	Symplocaceae	<i>Symplocos paniculata</i> (Thunb.) Miq.	Tree	1400	LC
184	Theaceae	<i>Camellia kissii</i> Wall.	Tree		LC
185	Theaceae	<i>Schima wallichii</i> (DC.) Korth.	Tree	900-2100	LC
186	Thymelaeaceae	<i>Edgeworthia gardneri</i> (Wall.) Meisn.	Shrub	1500-3000	LC
187	Urticaceae	<i>Boehmeria virgata</i> var. <i>macrostachya</i> (Wight) Friis & Wilmot-Dear	Shrub	1400	LC
188	Urticaceae	<i>Elatostema monandrum</i> (Buch.-Ham. ex D.Don) H.Hara	Herb	1470	
189	Urticaceae	<i>Elatostema platyphyllum</i> Wedd.	Shrub	700-1900	
190	Urticaceae	<i>Urtica dioica</i> L.	Herb	1000-4000	LC
191	Viburnaceae	<i>Viburnum mullaha</i> Buch.-Ham. ex D.Don	Tree		LC
192	Violaceae	<i>Viola betonicifolia</i> Sm.	Herb		
193	Violaceae	<i>Viola pilosa</i> Blume	Herb	1400-2000	
194	Vitaceae	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Climber	300-1600	
195	Vitaceae	<i>Leea asiatica</i> (L.) Ridsdale	Shrub	1400	LC
196	Zingiberaceae	<i>Amomum subulatum</i> Roxb.	Herb	500-2000	LC
197	Zingiberaceae	<i>Curcuma angustifolia</i> Roxb.	Herb	100-1500	
198	Zingiberaceae	<i>Hedychium spicatum</i> Sm.	herb	1200-3000	LC
199	Zingiberaceae	<i>Kaempferia rotunda</i> L.	Herb	1300-2000	

According to the IUCN Red List category 76 species of plant are listed, the majority of these are listed under least concern with 73 plant species while vulnerable, near threatened and extinct in the wild with one species each out of the total species recorded to Nepal. The floristic assessment of the present study revealed the presence of endemic species belonging to 33 distinct families and 17 genera to Nepal out of the total species recorded which represents a significant concentration of restricted range taxa,

underscoring its ecological significance. Pteridophytes were observed with 8 families and 14 species which may be due to low moisture and high evaporation relating to changes in rainfall patterns, rise in temperature and excessive invasion of the invasive alien plant species in little moist and wet areas.

In this present finding altogether 185 species of phanerogam plants categorized under 161 genera out of 69 families. *Ficus* with eight species was the dominant genera succeeded by *Coelogyne* and *Pteris* each with three species along with *Bambusa*, *Buddleja*, *Castanea*, *Citrus*, *Commelina*, *Datura*, *Elatostema*, *Hypericum*, *Prunus*, *Rubus*, *Smilax*, *Solanum* and *Viola* each with two species while the remaining were single species consecutively in a row. The richest family was found to be Orchidaceae with 16 species succeeded by Poaceae with 15 species. The most dominant family of many other findings, Asteraceae was found to be the third highest family in this area with 12 species. This may be due to the different period for taxonomic data collection. The life form of plant species was found mostly dominated on herbs with 108 species. The presence of herbs in nature is predominant in comparison to other life forms (Shrestha and Dhillion, 2003; Chaudhary et al., 2020; Magar et al; 2022).

Table 2. Endemic family and genera out of total taxa in the present study.

Family	Genus
Acanthaceae	<i>Justicia</i>
Amaranthaceae	
Amaryllidaceae	<i>Allium</i>
Apiaceae	
Apocynaceae	
Asparagaceae	<i>Asparagus</i>
Asteraceae	<i>Artemisia/ Taraxacum</i>
Balsaminaceae	<i>Impatiens</i>
Berberidaceae	<i>Berberis</i>
Brassicaceae	
Caryophyllaceae	<i>Silene</i>
Cyperaceae	
Elaeagnaceae	<i>Elaeagnus</i>
Ericaceae	<i>Rhododendron</i>
Euphorbiaceae	<i>Eria</i>
Fabaceae	<i>Crotalaria</i>
Gentianaceae	<i>Gentiana</i>
Hypericaceae	<i>Hypericum /Hypericum</i>
Iridaceae	
Lamiaceae	
Lauraceae	
Lythraceae	
Orchidaceae	
Orobanchaceae	
Poaceae	<i>Poa</i>
Polygonaceae	
Primulaceae	
Rosaceae	<i>Potentilla /Prunus /Prunus</i>

Rubiaceae
Salicaceae
Scrophulariaceae
Urticaceae
Zingiberaceae

The altitude distribution which lies in the sub-tropical region is favored mostly by Castanopsis Forest. The two community forests located in Rangbhang- Bhainsegaunda have a collection of large species of flora within the area which is a good example of community users' contribution towards the protection and management of wild flora.

In this study, one species of gymnosperm has been recorded i.e. *Pinus roxburghii* Sarg. Belonging to Pinaceae family. In Nepal, a total 26 number of gymnosperms are found representing 5.1% of the world's known total gymnosperms according to Bista (2006). Bhattarai et al. (2018) reported the same one species of gymnosperm as the dominating tree species in the sub-tropical forest region of the Makwanpur district, which is like the present observation.

DISCUSSIONS

The floristic diversity and life patterns of plant species across the range of Rangbhang- Bhainsegaunda. The orchid family stands out as one of the largest, most varied and unique groups of flowering plants with an estimated 20,000 to 35,000 species globally (Dressler, 1993). The Himalayan region alone is home to over 850 orchid species (Royal Botanic Gardens, Kew) this could be the reason with high number of orchid species listed in the present study. In a study, (Fraser-Jenkins et al., 2015) reported 550 species of Pteridophytes in Nepal out of which 14 species were found in this study. Among these species, Pteridophytes consist of 14 species categorized by 12 genera and 8 families. (Tiruwa et al., 2024) in a study of Orchids in Annapurna Conservation Area highlighted 198 species of orchids as the highest species rich family which aligns with the present study. The study in Gulmi reported that herbs with 42.35% was dominant based on life form categories succeeded by tree with 38.82% and shrub with 18.82% which resembles with the present study (Bhandari and KC, 2024). In similar research in Nagarkot 43 species of Poaceae were listed with abundant species present in the altitude between 1330-1610 m which is like this study (Kharbuja, 2024). The higher plant diversity in China reported 35112 native species belonging to 3818 genera and 454 families. The top 10 families with highest species diversity were Asteraceae, Poaceae, Fabaceae, Orchidaceae which contradicts with this study as 4th highest family in plant diversity in China is the dominant in this study area. The area coverage of these families could be a significant in the data of the study (Wang et al., 2015). The total number of endemic species in a specific location or the percentage of all extant taxa present (apart from exotics) are two further ways to express endemism. Increases in geographic areas therefore correspond to increases in

endemism (Major, 1988). The protection of plants including orchid species is an important subject where many countries in the world have enforced laws for conservation (Ronsted et al., 2022).

CONCLUSIONS

The present study listed the floristic diversity at the hills of Rangbhang- Bhaisegaunda located in junction of Biruwa Rural Municipality and Putalibazar Metropolitan City-2, Syangja district of Gandaki province to explore the flora and plant species diversity patterns of the study area. A total of 199 plant species has been listed where Orchidaceae and Poaceae family are dominant with high number of plant species. The presence of diverse flora within the minimum altitudinal range signifies the richness of the biodiversity in this habitat. This natural biological-rich spot should be given high importance for further research and study to promote the flora and fauna of this region. Similarly, greater number of plants have been listed under IUCN Red List category which signifies the importance of the conservation and protection of Biruwa Rural Municipality and Putalibazar Metropolitan City-2.

RECOMENDATIONS

1. Awareness program on IUCN Red List & endemic species regarding existing policies as well as cultural, social and economic importance.
2. Protection and conservation practices of flora should be promoted ensuring that the species are not threatened under the IUCN Red List category.
3. Research and studies on the floral species should be carried out both seasonally as well as periodically and in greater tendency with emphasis provided to botanical students.
4. Local government should conduct more effective programs than existing ones to protect and conserve the endemic as well as IUCN Red List plant species.

Declarations

ACKNOWLEDGEMENT

I am thankful to Raju Acharya sir for the coordination, in overall every visit to the field. Likewise, I want to thank Bal Kumar Gurung sir for providing a roadmap to the survey site during the overall work and humble guidance during field observation. I appreciate Dr. Devendra M. Bajracharya, Professor Emeritus and Gyanu Thapa Magar, Tribhuvan University for herbarium identification. I also am thankful to all the local people of Rangbhang-Bhaisegaunda who always motivated me to explore during field study. My sincere gratitude is extended to my family members and friends for their unwavering love, support and encouragement in every circumstance throughout my research work. Finally, but just as importantly, I would like to express my profound gratitude to all the non-teaching staff of Amrit campus that helped me in any way during my research.

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Plate

Plate 1 is available in the Supplementary Files section.

Figures

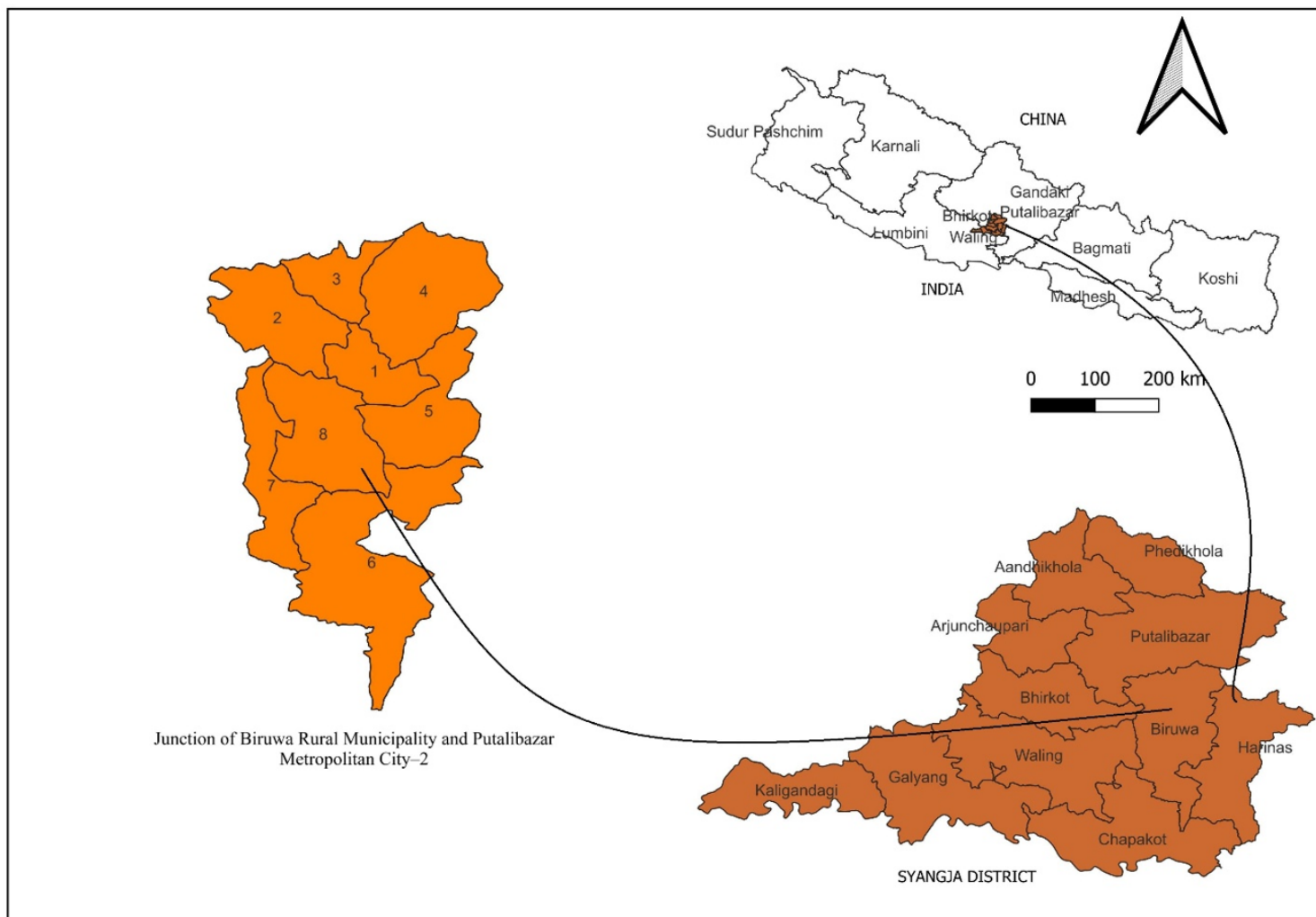


Figure 1

Map showing the study area in Syangja district along with junction of Biruwa Rural Municipality and Putalibazar Metropolitan City-2.

Rangbhang- Bhainsegaunda in junction of Biruwa Rural Municipality and Putalibazar Metropolitan City-2 is surrounded by five other rural municipalities and the Tanahu district in the east. The elevation ranges from 200-2266m which consists of three climatic zones; temperate, tropical and sub-tropical which accord the varieties of forest and natural resources.

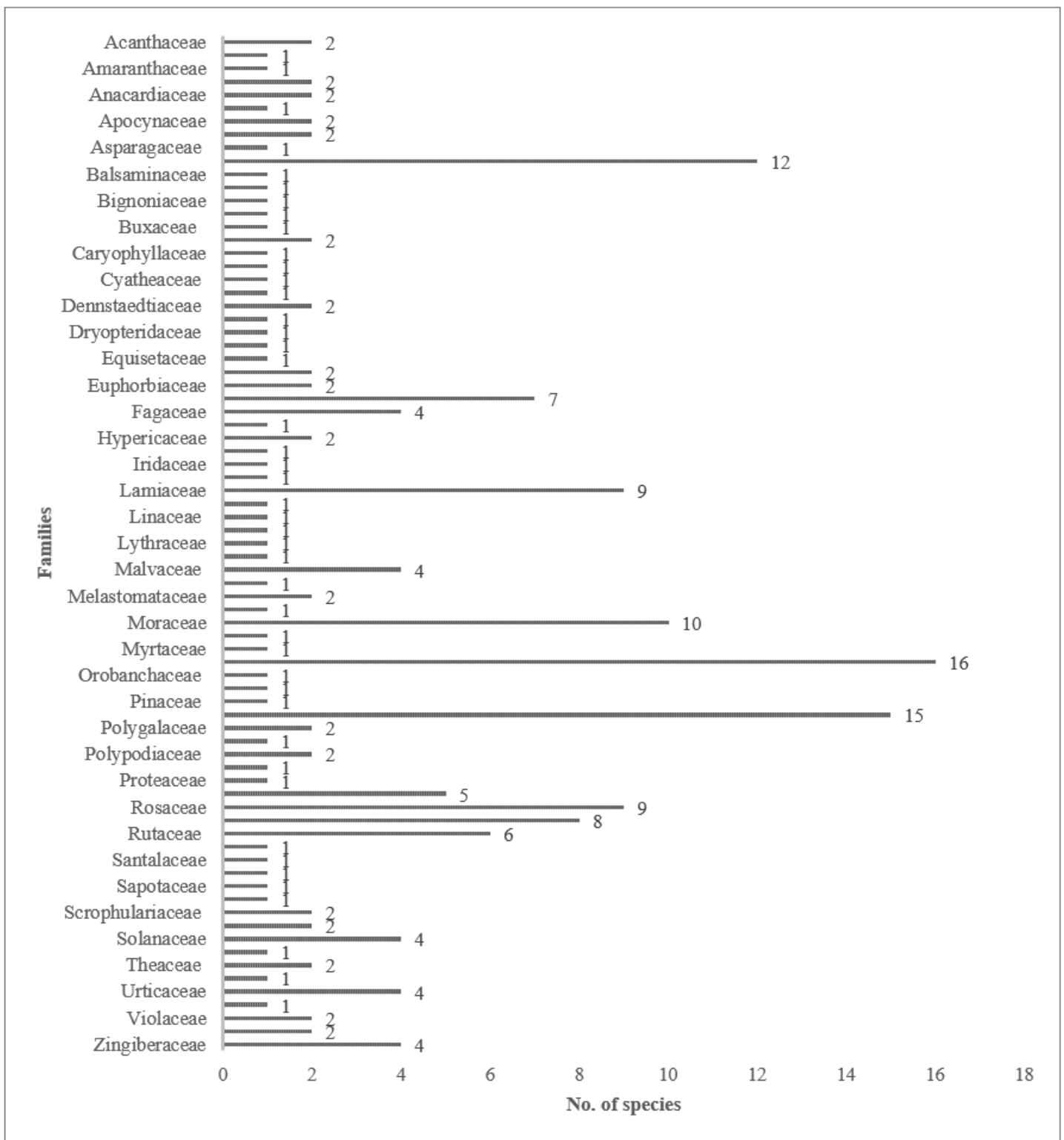


Figure 2

Families with the number of species.

Supplementary Files

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- [plate1.png](#)