



Diversity of climbers and their conservation status in the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh, India

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Received: May 13, 2025 | Accepted: July 13, 2025 | Published: February 3, 2026

Abstract

This study provides a comprehensive assessment of the floristic diversity and conservation status of climbers in the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh, India. Climbers have special horticultural characteristics due to their ornamental features but they have inherently weak stems; hence, they develop a variety of climbing mechanisms to support their growth and development in diverse habitats. To document the diversity of climbers in the sanctuary, extensive field surveys have been conducted, supplemented by herbarium studies and evaluation of their conservation status according to the IUCN Red List. A total of 95 climbers, constituting of 53 lianas and 42 vines, under 33 families, have been recorded. *Convolvulaceae* was found to be the largest family of 17 species. The study also reveals the twinning behavior of plants with species exhibiting right- or left-handed twinning patterns, and, notably, the right-handed have been found to be more prevalent in that area. The conservation assessment according to the IUCN data has assigned to these climbers a threat status, including NE (78 sp.), LC (16 sp.), and CR (1 sp.).

Keywords

climbers; diversity; IUCN; lianas; sanctuary; vines

Citation

Mani, R., Verma, A., Anand, S., Yadav, R. K., Singh, S., Gond, D. K. 2026. Diversity of climbers and their conservation status in the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh, India. *Phytologia Balcanica*. 32: 41-49 -- ISSN 1310-7771 (print), 1314-0027 (online).

Introduction

A wide variety of climbers are generally found in nature. Climbers are plants that require external support or self-attachment to grow vertically or prostrate (Kumar & al. 2012). Climbers are mainly characterized by climbing habits, divided into two types: lianas and vines. Lianas are woody climbers, and vines are herbaceous climbers (Sperotto & al. 2020). They are classified as plants because

of their unique structural ability to ascend on supports to maintain their stems mechanically. Climber species are found in almost half of the families of vascular plants (Schenk 1892). In families like *Vitaceae*, nearly all species are climbers. Climbers and lianas are crucial for biodiversity, forest regeneration and such ecosystem processes as soil erosion management, annual leaf biomass contribution, and whole-forest transpiration and carbon sequestration (Ogawa 1965; Klinge & Rodriguez 1973; Putz 1983). They are also a major source of food for some

primates, animals, and insects. They diminish by 50% the past-harvest canopy gaps and the surrounding tree damage (Fox 1968; Appanah & Putz 1984). Since the study area is botanically unexplored, no investigations have been conducted by any researches regarding the climbers. Due to habitat fragmentation, deforestation and forest disturbance, it is necessary to document the climbers and lianas and their patterns of climbing in the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh.

Study area

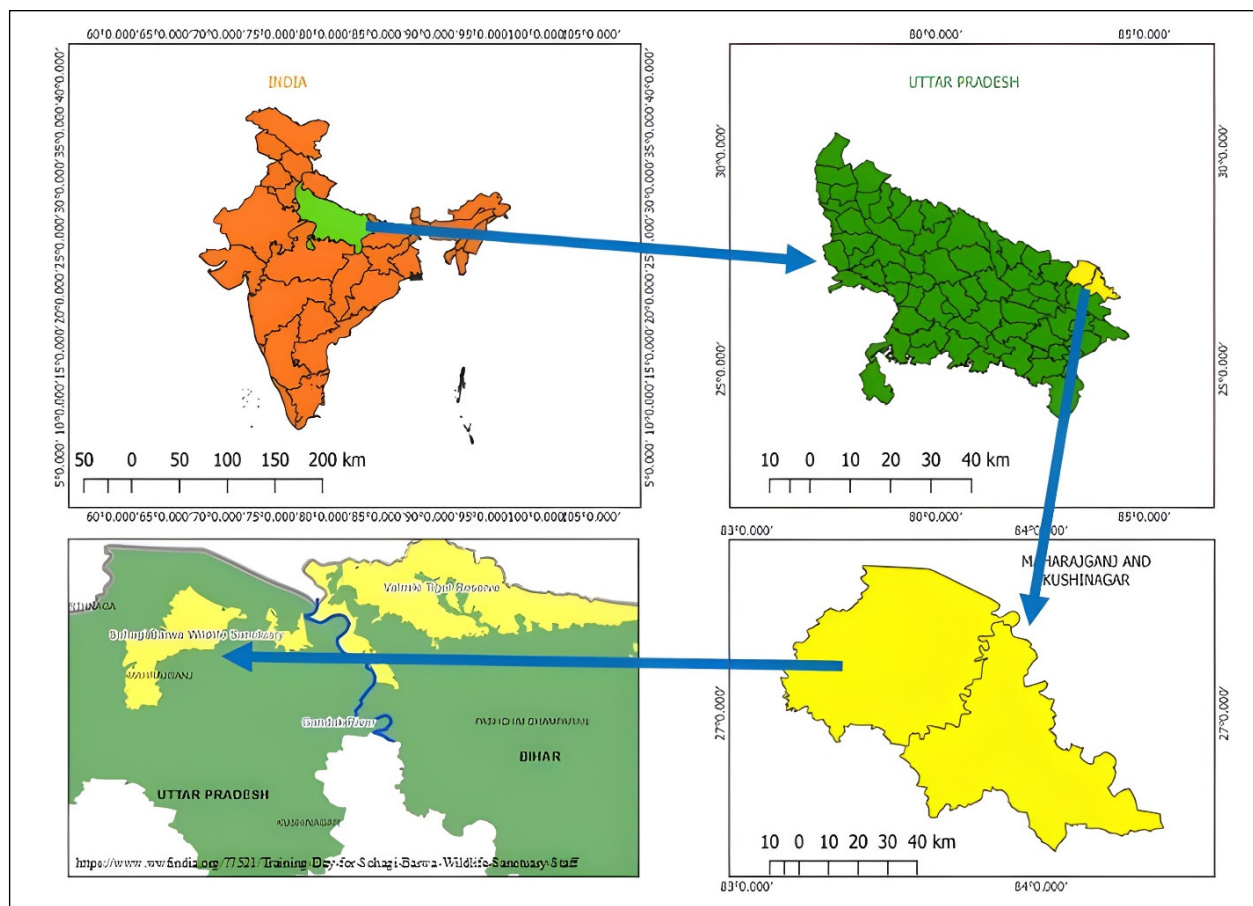
The Sohagi Barwa Wildlife Sanctuary Maharajganj, Uttar Pradesh (Fig. 1) lies in the districts of Maharajganj and Kushinagar of Uttar Pradesh. The sanctuary shares an international boundary with Nepal on the northern side, and in the east borders on Valmiki Tiger Reserve in Bihar. It is drained by several rivers like Great Gandak, Little Gandak, Pyas, and Rohin. The area is located in the terai region of the Himalayas and lies between $26^{\circ} 58'$ to $27^{\circ} 25'$ N and $83^{\circ} 23'$ to $84^{\circ} 10'$ E. It covers 428.2 km^2 of a vast alluvial plain. The temperature ranges between 0°C and 40°C . The average annual rainfall exceeds 1500 mm. Its altitude varies between 95-103 m above sea level. The area has a temperate climate and divides into seven

ranges with 21 grasslands. The vegetation is of the North Moist Deciduous Type and Sal Forest. About 80% of the Sohagi Barwa Wildlife Sanctuary is woodland.

Methodology

The presented data is based on a comprehensive field survey and vegetation analysis from January 2023 to October 2024 in the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh. The climbers have been found mainly at the roadside and where the canopy was broken. Plant specimens have been collected and tagged with the location, date of collection, collection number, and field description. For identification of the plant species, various online literature sources like *Flora of India*, *Flora of Uttar Pradesh*, POWO, and some local and regional floras were used (Srivastava 1976; Saini & al. 2010). Bentham and Hooker's system of classification was applied to arrange the families in a tabular form. The authors' citation and botanical name followed The International Plant Name Index (IPNI). The conservation status of each species was assessed using the IUCN 2024 list. The species of climbers were confirmed by comparing them with the *Flora of Uttar Pradesh*. The specimens were dried and the samples were stored at the Herbarium of CMP Degree College, Allahabad.

Fig. 1. Map of the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh, India.



The climbing plants were categorized into three groups on the basis of their height, namely: upper strata (higher than 20 m), middle strata (10-20 m), and lower strata (below 10 m). The height was measured with a clinometer. The climbing strategies were recorded during observation of the climbing plants, and are based on Sperotto & al. 2020. The climbing strategies were divided into active and passive climbing types. The categories of active climbing were as follows: (1) twining stem, which performs a twining function and contains two groups: dextrose and sinistrose, (2) twining tendrils as short, thin, wrapping and grasping structures with hooks and adhesive pads at the end. The tendril may be leaves, branches, stipules, and inflorescence, (3) twining leaf petioles, where petioles are twisted around support, (4) prehensile branch, where the lateral leaf-bearing branches serve a twining purpose, (5) a modification of shoot or second-order branches, (6) twining peduncles or inflorescence modified to twine. The categories of passive climbing were as

follows: (1) simple scrambling: when climbers do not use hooks or grapnels and may or may not be supported by prickles, spines, and thorns. (2) hooks or grapnels: these are specialized features of the plants to snag the host. (3) adhesive roots: climbers' accidental roots can adhere to rock walls and trees.

Results and discussion

A total of 95 climbing species (Table 1) belonging to 73 genera and 33 families were found in the vegetation. Out of the 95 collected different climbing species, 38 were annual climbers and 57 species were perennial. The maximum of 17 species belonged to the family *Convolvulaceae* (Fig. 2) followed by *Fabaceae* (16), *Cucurbitaceae* (9), *Apocynaceae* (8), *Menispermaceae* (6), and *Dioscoreaceae* (5). *Convolvulaceae* has the greatest number of species and *Ipomoea* was the dominant genus.

Table 1. Different climber species with their life span, stratification, climber category, climbing mode, and conservation status found in Sohagi Barwa Wildlife Sanctuary, Maharajganj

S.No.	Family	Species	Life-span	Stratification	Climber category	Climbing mode	IUCN Status	Voucher No.
1.	<i>Acanthaceae</i>	<i>Thunbergia grandiflora</i> Roxb.	Per	US	L	TW	NE	124
2.	<i>Apocynaceae</i>	<i>Aganosma heynei</i> (Spreng.) I.M.Turner	Per	MS	V	TW	NE	136
3.	<i>Apocynaceae</i>	<i>Cryptolepis buchananii</i> R. Br. ex Roem. & Schult.	Per	MS	L	TW	NE	125
4.	<i>Apocynaceae</i>	<i>Cryptolepis sinensis</i> (Lour.) Merr.	Per	MS	L	TW	NE	126
5.	<i>Apocynaceae</i>	<i>Telosma pallida</i> (Roxb.) Craib	Per	LS	L	Str-UA	NE	130
6.	<i>Apocynaceae</i>	<i>Ichnocarpus frutescens</i> (L.) W.T. Aiton	Per	LS	L	Str-UA	NE	131
7.	<i>Apocynaceae</i>	<i>Hemidesmus indicus</i> (L.) R. Br.	Per	LS	L	Str-UA	NE	132
8.	<i>Apocynaceae</i>	<i>Secamone alpini</i> Schult.	Per	LS	L	TW	NE	133
9.	<i>Apocynaceae</i>	<i>Vincetoxicum spirale</i> (Forssk.) D.Z.Li	A	LS	V	TW	NE	134
10.	<i>Apocynaceae</i>	<i>Cryptostegia grandiflora</i> Wight	A	LS	V	TW	NE	135
11.	<i>Araceae</i>	<i>Scindapsus officinalis</i> (Roxb.) Schott	Per	US	L	AR	NE	127
12.	<i>Arecaceae</i>	<i>Calamus tenuis</i> Roxb.	Per	LS	L	Str-A	NE	128
13.	<i>Aristolochiaceae</i>	<i>Aristolochia indica</i> L.	Per	LS	L	TW	NE	129
14.	<i>Asteraceae</i>	<i>Mikania congesta</i> DC.	A	LS	V	TW	NE	137
15.	<i>Basellaceae</i>	<i>Basella alba</i> L.	A	LS	V	TW	NE	138
16.	<i>Bignoniaceae</i>	<i>Campsis grandiflora</i> (Thunb.) K.Schum.	Per	LS	V	Str-UA	NE	139
17.	<i>Bignoniaceae</i>	<i>Tecoeria capensis</i> (Thunb.) Spach	Per	LS	L	Str-UA	LC	140
18.	<i>Capparaceae</i>	<i>Capparis zeylanica</i> L.	Per	MS	L	Str-A	NE	300
19.	<i>Celastraceae</i>	<i>Celastrus paniculatus</i> Willd.	Per	MS	L	TW	NE	301
20.	<i>Combretaceae</i>	<i>Combretum pavonii</i> G.Don.	Per	US	L	Str-UA	NE	146

S.No.	Family	Species	Life-span	Stratification	Climber category	Climbing mode	IUCN Status	Voucher No.
21.	Convolvulaceae	<i>Argyreia argentea</i> (Roxb.) Sweet.	Per	LS	L	Str-UA	NE	302
22.	Convolvulaceae	<i>Argyreia nervosa</i> (Burm. f.) Bojer	Per	LS	L	Str-UA	NE	303
23.	Convolvulaceae	<i>Convolvulus arvensis</i> L.	A	LS	V	TW	NE	149
24.	Convolvulaceae	<i>Erycibe paniculata</i> Roxb.	Per	MS	L	TW	NE	150
25.	Convolvulaceae	<i>Ipomoea aquatica</i> Forssk.	A	LS	V	Str-UA	LC	205
26.	Convolvulaceae	<i>Ipomoea cairica</i> (L.) Sweet	A	LS	V	TW	LC	152
27.	Convolvulaceae	<i>Ipomoea eriocarpa</i> R. Br.	A	LS	V	TW	NE	299
28.	Convolvulaceae	<i>Ipomoea hederifolia</i> L.	A	LS	V	TW	NE	274
29.	Convolvulaceae	<i>Ipomoea alba</i> L.	A	LS	V	TW	NE	282
30.	Convolvulaceae	<i>Ipomoea muricata</i> (L.) Jacq.	A	LS	V	TW	NE	263
31.	Convolvulaceae	<i>Ipomoea nil</i> (L.) Roth.	A	LS	V	TW	NE	231
32.	Convolvulaceae	<i>Ipomoea purpurea</i> (L.) Roth.	Per	LS	V	TW	NE	242
33.	Convolvulaceae	<i>Ipomoea quamoclit</i> L.	A	MS	V	TW	NE	173
34.	Convolvulaceae	<i>Distimake dissectus</i> (Jacq.) A.R. Simoes & Staples	A	LS	V	TW	NE	160
35.	Convolvulaceae	<i>Merremia hederacea</i> (Burm. f.) Hallier. f.	A	LS	V	TW	NE	161
36.	Convolvulaceae	<i>Operculina turpethum</i> (L.) Silva Manso	Per	LS	L	TW	NE	162
37.	Convolvulaceae	<i>Poranopsis paniculata</i> (Roxb.) Roberty	Per	MS	L	TW	NE	163
38.	Cucurbitaceae	<i>Benincasa hispida</i> (Thunb.) Cogn.	A	LS	V	TD	NE	164
39.	Cucurbitaceae	<i>Coccinia grandis</i> (L.) Voigt	A	MS	V	TD	NE	165
40.	Cucurbitaceae	<i>Trichosanthes cucumerina</i> L.	A	LS	V	TD	NE	264
41.	Cucurbitaceae	<i>Cucumis trigonus</i> Roxb.	A	LS	V	TD	NE	265
42.	Cucurbitaceae	<i>Diplocyclos palmatus</i> (L.) C. Jeffrey	A	LS	V	TD	NE	266
43.	Cucurbitaceae	<i>Momordica dioica</i> Roxb. ex Willd.	A	LS	V	TD	NE	267
44.	Cucurbitaceae	<i>Cucumis maderaspatanus</i> L.	A	LS	V	TD	NE	304
45.	Cucurbitaceae	<i>Solena heterophylla</i> Lour.	Per	LS	V	TD	NE	305
46.	Cucurbitaceae	<i>Momordica charantia</i> L.	A	LS	V	TD	NE	306
47.	Cuscutaceae	<i>Cuscuta chinensis</i> Lam.	A	LS	P	TW	NE	307
48.	Cuscutaceae	<i>Cuscuta reflexa</i> Roxb.	A	LS	P	TW	LC	308
49.	Dioscoreaceae	<i>Dioscorea bulbifera</i> L.	Per	MS	L	TW	NE	230
50.	Dioscoreaceae	<i>Dioscorea cumingii</i> Prain & Burkill	A	LS	L	TW	NE	232
51.	Dioscoreaceae	<i>Dioscorea japonica</i> Thunb.	A	LS	V	TW	NE	233
52.	Dioscoreaceae	<i>Dioscorea oppositifolia</i> L.	Per	LS	L	TW	NE	178
53.	Dioscoreaceae	<i>Dioscorea pentaphylla</i> L.	Per	LS	L	TW	NE	179
54.	Euphorbiaceae	<i>Cleistanthus stipularis</i> Mull. Arg.	Per	MS	L	Str-A	LC	180
55.	Fabaceae	<i>Phanera vahlii</i> (Wight & Arn.) Benth.	Per	US	L	TD	NE	141
56.	Fabaceae	<i>Guilandina bonduc</i> L.	Per	LS	L	Str-A	LC	142
57.	Fabaceae	<i>Biancaea decapetala</i> (Roth) O. Deg	Per	LS	L	Str-A	LC	143
58.	Fabaceae	<i>Mezoneuron cucullatum</i> (Roxb.) Wight & Arn.	Per	MS	L	Str-A	NE	189
59.	Fabaceae	<i>Clitoria ternatea</i> L.	Per	LS	L	TW	NE	193
60.	Fabaceae	<i>Dalbergia monetaria</i> L. f.	Per	LS	L	Str-A	NE	194

S.No.	Family	Species	Life-span	Stratification	Climber category	Climbing mode	IUCN Status	Voucher No.
61.	Fabaceae	<i>Brachypterum scandens</i> (Roxb.) Wight & Arn. ex Miq.	A	LS	V	TW	LC	195
62.	Fabaceae	<i>Lathyrus aphaca</i> L.	Per	LS	L	TW	NE	196
63.	Fabaceae	<i>Lathyrus sativus</i> L.	Per	MS	L	Str-UA	LC	197
64.	Fabaceae	<i>Millettia extensa</i> (Benth.) Benth. ex Baker	Per	MS	L	TW	LC	198
65.	Fabaceae	<i>Mucuna pruriens</i> (L.) DC.	A	LS	V	TD	LC	309
66.	Fabaceae	<i>Rhynchosia minima</i> (L.) DC.	A	LS	V	TD	CR	310
67.	Fabaceae	<i>Lathyrus odoratus</i> L.	A	LS	V	TD	NE	296
68.	Fabaceae	<i>Senegalia rugata</i> (Lam.) Britton & Rose.	Per	MS	L	Str-UA	NE	202
69.	Fabaceae	<i>Abrus precatorius</i> L.	A	LS	L	TW	LC	144
70.	Fabaceae	<i>Cajanus scarabaeoides</i> (L.) Thouars	A	LS	V	TW	LC	204
71.	Liliaceae	<i>Asparagus racemosus</i> Willd.	Per	LS	V	TW	NE	199
72.	Liliaceae	<i>Gloriosa superba</i> L.	A	LS	V	TD	LC	182
73.	Menispermaceae	<i>Cissampelos pareira</i> L.	Per	US	L	TW	NE	220
74.	Menispermaceae	<i>Cocculus hirsutus</i> (L.) W. Theob.	Per	LS	L	TW	NE	225
75.	Menispermaceae	<i>Nephroia orbiculata</i> (L.) L. Lian. & Wei Wang	Per	LS	L	TW	NE	185
76.	Menispermaceae	<i>Stephania japonica</i> (Thunb.) Miers	A	LS	V	TW	NE	326
77.	Menispermaceae	<i>Tiliacora acuminata</i> (Lam.) Miers.	Per	US	L	TW	NE	262
78.	Menispermaceae	<i>Tinospora cordifolia</i> (Willd.) Hook. F. & Thomson	Per	US	L	TW	NE	238
79.	Moraceae	<i>Ficus heterophylla</i> L.f.	Per	LS	L	Str-UA	LC	248
80.	Passifloraceae	<i>Passiflora foetida</i> L.	A	LS	V	TD	NE	254
81.	Piperaceae	<i>Piper longum</i> L.	Per	LS	L	Str-UA	NE	206
82.	Polygonaceae	<i>Antigonon leptopus</i> Hook. & Arn.	Per	LS	V	TD	NE	207
83.	Primulaceae	<i>Embelia ribes</i> Burm.f.	Per	MS	L	Str-UA	NE	291
84.	Primulaceae	<i>Embelia tsjeriam-cottam</i> (Roem. & Schult.) A.DC.	Per	LS	L	Str-UA	NE	192
85.	Ranunculaceae	<i>Clematis gouriana</i> Roxb. ex DC.	Per	LS	L	TW	NE	289
86.	Ranunculaceae	<i>Clematis zeylanica</i> (L.) Poir.	Per	LS	L	TD	NE	166
87.	Rhamnaceae	<i>Ziziphus oenopolia</i> (L.) Mill.	Per	LS	L	Str-A	NE	316
88.	Rubiaceae	<i>Paederia foetida</i> L.	A	LS	L	TW	NE	312
89.	Sapindaceae	<i>Cardiospermum halicacabum</i> L.	A	LS	V	TW	LC	269
90.	Smilacaceae	<i>Smilax blumi</i> A. DC.	Per	LS	L	TD	NE	275
91.	Smilacaceae	<i>Smilax zeylanica</i> L.	Per	LS	L	TD	NE	276
92.	Vitaceae	<i>Causonis trifolia</i> (L.) Mabb. & J. Wen	Per	LS	L	TD	NE	215
93.	Vitaceae	<i>Cissus adnata</i> Roxb.	Per	LS	V	TD	NE	311
94.	Vitaceae	<i>Tetrastigma leucostaphylum</i> (Dennst.) Alston.	Per	MS	L	TD	NE	297
95.	Vitaceae	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Per	LS	L	TD	NE	268

Abbreviations: A = Annual, Per = Perennial, US=Upper strata, MS=Middle strata, LS=Lower strata, L = Liana (woody climber), V = Vine (herbaceous climber), TW=Twining, TD= Tendrilar, Str-A=Straggling Armed, Str-UA= Straggling Unarmed, AR=Aerial root, NE=Not evaluated, LC=Least concern, CR=Critically endangered

Fig. 2. The six most dominant families with percentage of their species.

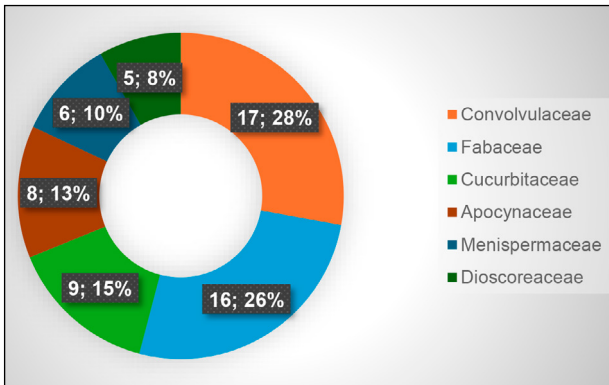


Fig. 3: Different types of species present in different kinds of vegetation. (Abbreviations: G=grassland, W= wasteland, F= forest)

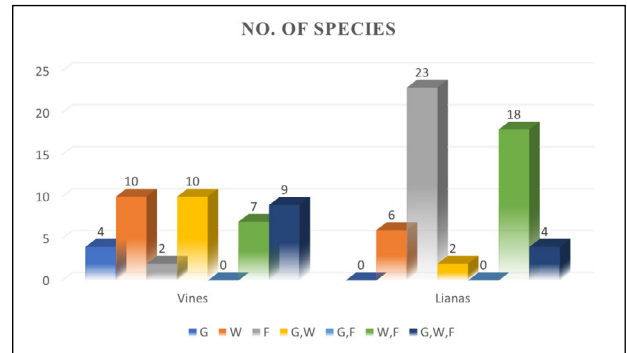


Fig. 4. Different types of climber species found in the Sohagi Barwa Wildlife Sanctuary; (A). *Calamus tenuis* Roxb., (B). *Gloriosa superba* L., (C). *Diplocyclos palmatus* (L.) C. Jeffrey., (D). *Ziziphus oenopolia* (L.) Mill., (E). *Cocculus hirsutus* (L.) W. Theob., (F). *Trichosanthes cucumerina* L., (G). *Dioscorea pentaphylla* L., (H). *Aristolochia indica* L., (I). *Hemidesmus indicus* (L.) R. Br.



Among the three vegetation types (Fig. 3), there was significant variation in the number of climbers species. Twelve species were found only in the forest, seven species only in wastelands, and only two species were unique to grassland vegetation. The remaining 29 species have been found in both combinations. In the grasslands, the species-per-genus and the species-per-family ratio was higher. There were 53 species of woody climbers (lianas) and 42 species of herbaceous climbers (vines) among the climbing plants. The vines comprised two parasite species: *Cuscuta reflexa* and *Cuscuta chinensis* (Fig. 5C). Vines were dominant in the grassland, and lianas were dominant in the forest vegetation. It was discovered that both types of climbers thrived best on wasteland vegetation.

Five distinct climbing modes have been identified in this study (Table 1). Of all climbing species, 51% were of the twinning type, 24% of the tendril type, 8% of the straggling armed type, 16% of the straggling-unarmed type, and 1% of the adhesive root type. The twinning type of climbers manifested many patterns of climbing, namely, right-handed stem twinning (sinistrose) in *Abrus precatorius*, *Cajanus scarabaeoides* (Fig. 6), *Clitoria ternatea*, *Brachypterum scandens*, *Mucuna pruriens*, *Rhynchosia minima*, *Paederia foetida*, *Dioscorea oppositifolia*, *Asparagus racemosus*, *Cocculus hirsutus*, *Stephania japonica*, *Tinospora cordifolia*, *Hemidesmus indicus*, *Telosma pallida*, *Basella alba*, *Celastrus paniculatus*, *Thunbergia grandiflora*, *Ichnocarpus frutescens*, *Aristolochia indica*, and left-

Fig. 5. Different types of climber species found in the Sohagi Barwa Wildlife Sanctuary; (A). *Cissampelos pareira* L., (B). *Smilax blumi* A. DC., (C). *Cuscuta chinensis* Lam., (D). *Momordic dioica* Roxb. Ex. Willd., (E). *Causonis trifolia* (L.) Mabb. & J. Wen., (F). *Ipomoea aquatica* Forssk., (G). *Tinospora cordifolia* (Willd.) Hook. f. & Thomson., (H). *Coccinia grandis* (L.) Voigt., (I). *Merremia hederacea* (Burm. f.) Haill. f.

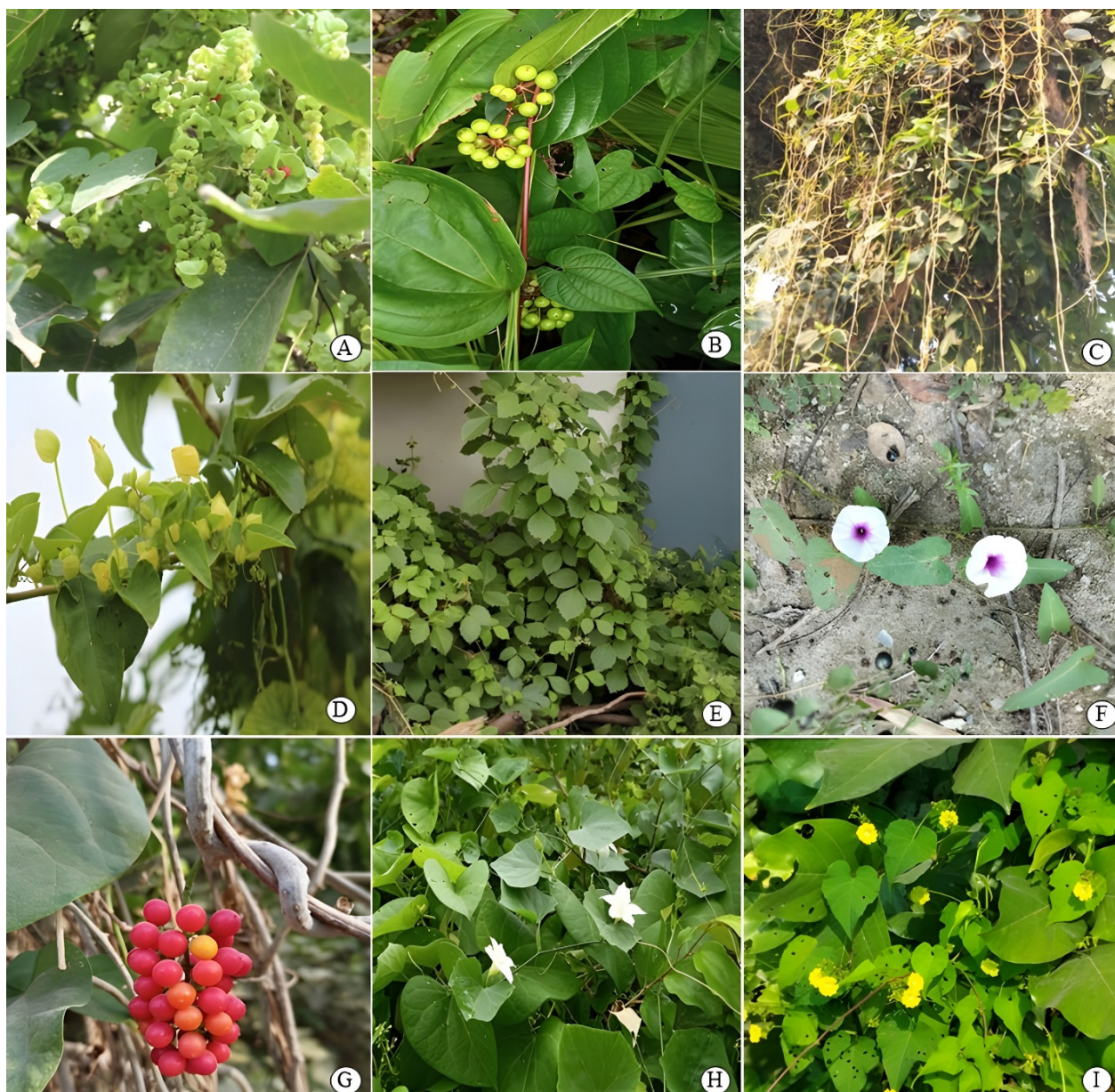
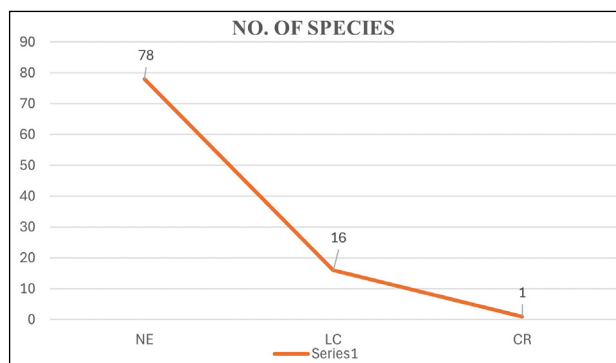


Fig. 6. Direction of twinning in two species: **(A).** right-handed stem twinning in *Cajanus scarabaeoides* (L.) Thouras., **(B).** left-handed stem twinning in *Dioscorea bulbifera* L.



Fig. 7. Climber species according to the different IUCN threat categories. **(Abbreviations:** NE= Not Evaluated, LC= Least Concern, CR=Critically Endangered)



handed stem twinning (dextrose) in *Distimake dissectus*, *Dioscorea bulbifera* (Fig. 6) and *Dioscorea pentaphylla*.

In terms of arrangement, of the 95 climber species 71 were in the lower strata, 17 in the middle strata and seven in the higher strata (Table 1). Of the few woody climbers, *Tinospora cordifolia* has climbed to the highest canopies. Most climbers in the middle strata were lianas. The herbaceous and less woody *Coccinia grandis*, *Dioscorea bulbifera* and *Ichnocarpus frutescens* could also reach this stratum by twining. *Capparis zeylanica*, however, formed thickets and were components of the middle strata. Most climbers in the lower strata were tendrillar in nature. They sprawled luxuriantly over shrubby plants, etc. The bottom strata were composed of *Mezoneuron cucullatum*, *Senegalia rugata*, *Capparis zeylanica*, and *Calamus tenuis*, which formed thickets.

All twinning and tendrillar climbers have displayed a common pattern of handedness. According to the IUCN

Red list, 78 species (82%) are classified as NE, 16 species (17%) as LC and one species (1%) as CR (Table 1 and Fig. 7). The NE plants are in danger of going extinct and ought to be put on IUCN Red List, which has not been done yet. There are still many LC species in the environment, which are crucial to biodiversity worldwide. Only one species is rated CR and needs to be protected.

Conclusions

In the present study of climbers, the assessment was done in view of the life span, strata differentiation, climber category, climbing mode, and conservation status at the Sohagi Barwa Wildlife Sanctuary, Maharajganj, Uttar Pradesh. Stem twinning is the most common mode of climbing and accounts for about 64% of all climber species. The area benefits greatly from the natural resources provided by the local climbing plants. However, numerous climbers have been exterminated in recent years due to frequent disturbances such as habitat degradation, grazing, trampling, and fire across the landscape. The number of NE species is higher in all types of climber species. The necessity of their conservation at regional level can be emphasized by the fundamental data on their diversity and distribution, and rising handedness pattern. In conclusion, lianas and climbers seem to be a category of ecologically significant plants, which should be taken into consideration in forest management planning.

Acknowledgements. The authors are grateful to the Principal and Head of the Department of Botany CMP Degree College, Prayagraj for providing laboratory support.

References

- Appanah, S. & Putz, F.E. 1984.** Climber abundance in virgin dipterocarp forest and the effect of pre-felling climber cutting on logging damage. – *Malays. For.*, **47**: 335-342.
- Fox, J.E.D. 1968.** Logging damage and the influence of climber cutting prior to logging in the lowland dipterocarp forest of Sabah. *Malays. For.*, **31**(4): 326-347.
- Klinge, H. & Rodrigues, W.A. 1973.** Biomass estimation in a central Amazonian rain forest. – *Acta Cient. Venez.*, **24**(6): 225-237.
- Kumar, S., Jena, P.K. & Tripathy, P.K. 2012.** Study of wild edible plants among tribal groups of Simlipal Biosphere Reserve Forest, Odisha, India; with special reference to *Dioscorea* species. – *IJBT*, **3**(1): 11-19.
- Ogawa, H. 1965.** Comparative Ecological Studies on Three Main types of Forest Vegetation in Thailand I. Structure and floristic composition. – *Nat. Life SE Asia*, **4**: 13-48.
- Putz, F.E. 1983.** Liana biomass and leaf area of a "tierra firme" forest in the Rio Negro Basin, Venezuela. – *Biotropica*, **15**(3):185-189.
- Putz, F.E. 1984.** The natural history of lianas on Barro Colorado Island, Panama. *Ecology*, **65**(6): 1713-1724.
- Saini, D.C., Singh, S.K. & Rai, K. 2010.** Biodiversity of aquatic and semiaquatic plants of Uttar Pradesh with special reference to eastern Uttar Pradesh. – Uttar Pradesh State Biodiversity Board, Lucknow, India
- Schenk, H. 1892.** Beitrage zur Biologie und Anatomie der Lianen, im Besonderen der in Brasilien einheimischen Arten. Theil I. Beitrage zur Biologie der Lianen – *Biol. Zentralbl.*, **12**: 708-713.
- Sousa-Baena, M.S., Sinha, N.R., Hernandez-Lopes, J. & Lohmann, L.G. 2018.** Convergent evolution and the diverse ontogenetic origins of tendrils in angiosperms. *Front. Plant Sci.*, **9**: 1-19.
- Sperotto, P., Acevedo-Rodríguez, P., Vasconcelos, T.N. & Roque, N. 2020.** Towards a standardization of terminology of the climbing habit in plants. – *Bot. Rev.*, **86**:180-210.
- Srivastava, T.N. 1976.** *Flora Gorakhpurensis*. Today & Tomorrow's Printers & Publishers, New Delhi, India.