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Original Article

Climber Diversity across Vegetational Landscape of North-Eastern Uttar Pradesh, India

Ashish DVIVEDI^{1*}, Sumit SRIVASTAVA², Ravindra P. SHUKLA¹

¹D.D.U. Gorakhpur University, Plant Ecology Laboratory, Department of Botany, Gorakhpur-273 009, Uttar Pradesh, India; dradvivedi@rediffmail.com (*corresponding author); drrpshukla@rediffmail.com ²Akhila Bhagya Post Graduate College, Department of Botany, Ranapar, Gorakhpur, Uttar Pradesh, India; srivastava980@gmail.com

Abstract

The composition and diversity of climbers among grassland, wasteland and forest vegetations was examined with respect to their woodiness, climbing mode and circumnutation pattern across the vegetational landscape of north-eastern Uttar Pradesh during 2011-2015. A total of 111 climbers, constituting 63 lianas and 48 vine species, under 35 families, were recorded. The forest and wasteland vegetation were quite similar in regard with climber diversity. Family Convolvulaceae included a maximum of 19 climbers. Majority of twining climbers showed right-handed twining. The wasteland vegetation was most suitable and quite similar to forest habitat for vines as well as for lianas. The right handed circumnutation was the dominant pattern among the twiners of the region. Local climbing flora provides considerable natural resource to the region. They often create special micro-habitats and increase the complexity of the ecosystem.

Keywords: circumnutation, climbing mode, liana, stratification, thicket, vine

Introduction

About half of the families of vascular plants contain climber species (Schenck, 1892). Gentry (1991) predicted a very high diversity of vines and lianas in the tropics with over 8,000 species under 130 families. A global analysis reported approximately 80% and 20% of lianas and vines in tropical regions, while in extra-tropical regions they account for 60% and 40%, respectively (Gallagher and Leishman, 2012). The ecological studies of climbers have dealt primarily with lianas (> 1 cm dbh) occurring in tropical forest communities (Schnitzer and Bongers, 2002; Burnham, 2004; Parthasarathy *et al.*, 2004; Jayakumar and Nair, 2013). However, relatively few studies have included vines (Kokou *et al.*, 2002; Gallagher *et al.*, 2011) which play a significant role in the structure and function of grassland ecosystem (Mao and Zhu, 2006; Zhang *et al.*, 2011).

Climbing plants also show great diversity in their climbing mechanisms (Putz, 1984; Bongers *et al.*, 2005). They include twiners, tendril climbers, root climbers and scramblers. Climbers also have evolved exaggerated form of circumnutation to increase the probability of encountering a support or avoiding hurdles (Darwin, 1875). Documentation on their behaviour and causes of circumnutation of twining and tendrilar climbers has been worked out by many researchers (Darwin, 1875; Brown, 1993; Larson, 2000; Silk and Holbrook, 2005; Gerbode *et al.*, 2012; Silva *et al.*, 2016). Twining plants generally show fixed handedness, either consistently forming right-handed or left-handed helices, as

they climb (Hashimoto, 2002; Edwards *et al.*, 2007). However, Davis (1974), exceptionally observed both in *Mikania micrantha* at different latitudes. Burnham and Revilla-Minaya (2011) presented the handedness of 60 twining taxa of a forest community in Peru and observed both the left and right handed twining in the same individual of a climbing species of family Dilleniaceae. The global trend in plant twining direction was analyzed by Edwards *et al.* (2007), but they were unable to observe any hand reversal in the same twining plant.

The present study provides an account on the diversity of taxa with climbing habit in different vegetation types of northeastern Uttar Pradesh, India. The study also emphasizes the handedness in twining and tendrilar types of climbers across the vegetation. So far, no information on handedness is available for climbers of India.

Materials and Methods

Study area

The vegetational landscape of north-eastern Uttar Pradesh lies within the Terai belt of the foot hills of the Himalayas. The area extends between 26°21' to 27°32' N latitude and 81°34' to 83°57' E longitude. Mean altitude of the study area is 95 m. The climate of the region is generally tropical monsoonic with three distinct seasons *viz.* summer (March to mid June), monsoon (mid June to mid Oct) and winter (mid Oct to Feb). The total average of annual rainfall is aprox. 1,704 mm, most of which (>94%) is received during monsoon and the rest is

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distributed in the form of occasional showers. The annual mean of relative humidity ranges between 74-87%. The mean maximum temperature during wet summer, winter and dry summer seasons are 34.1 °C, 23.2 °C and 36 °C and mean minimum temperatures are 24.3 °C, 10.3 °C° and 19.7 °C, respectively. The soil of the region is a part of trans-Sarju plain and comprises Gangetic alluvium, ranging from clayey to sandy loam in texture with pH ranging from 6.5 to 7.5.

The major vegetation (physiognomic) types identified in the region are forest, wasteland and grassland (Shukla, 2009). Though regional climax vegetation is semi-evergreen forest (Champion and Seth, 1968), but most of these have been converted into agricultural fields, orchards, human habitations and commercial plantations.

Methods

The current study is based on extensive field survey and analysis of vegetation across the vegetational landscape of the 11 districts of north-eastern Uttar Pradesh during 2011-2015. The identification was done using local and regional flora (Srivastava, 1976; Saini *et al.*, 2010) and online Indian floras. The species of climbers were identified with similar specimen of herbarium of Gorakhpur University. The botanical names and author citations were checked through International Plant Name Index (IPNI). An analysis of species diversity of climbers was made on the basis of taxa composing the vegetation types. The climbing mode, occurrence status and approximate life-span of different species have been tabulated in supplementary Table 1.

Climbing plants were inspected for their height they attained and grouped into upper strata (> 20 m), middle strata (10-20 m) and lower strata (< 10 m). The height was measured with the help of clinometer. The objects including plants which supported their climbing were marked and their circumnutation pattern was also observed. Tendrilar climbers were grouped into simple (or unbranched) and branched types. The pattern of handedness was also compared among individuals growing within different habitats or vegetation types. For common and abundant species, 20 individuals of each species were selected, separately for each vegetation types. However, only 5 individuals per species were inspected in case of rare species. The present study addresses climbers only of wild occurrence. The ornamental or garden climbers were excluded from the observation.

Results

Climber diversity

A total of 111 climbing species representing 81 genera under 35 families were encountered across the vegetational landscape of north-eastern Uttar Pradesh. The life-span data showed that about 58.6% of climbers were perennials and the remainders were annuals. Among the six dominant families, Convolvulaceae was the most climber-rich (19 species), followed by Papilionaceae (15 Species), Cucurbitaceae (10 species), Asclepiadaceae (9 species), Dioscoreaceae and Menispermaceae (6 each). The remaining 46.85% of climbers represented 29 families, of which 18 families were represented by only one species of climbers. In terms of genera, Papilionaceae was the most dominant (13), while *Ipomoea* was the most specious genera (11 climbers).

The number of species, genera and family of climbers was highly variable among the three vegetation types (Table 1). The forest and wasteland vegetation were quite similar in climber diversity as compared to grassland vegetation. The species per genus ratio and that of per family ratio was greater in the case of grassland. Among climbing plants, the woody climbers (lianas) were represented by 63 species and herbaceous climbers (vines) by 48 species. There were two parasitic vines *e.g. Cuscuta chinensis* and *C. reflexa*. The forest vegetation was largely dominated by lianas and grassland by vines. Wasteland vegetation was found to be the suitable habitat for both categories of climbers (Fig. 1).

Five climbing mode of climbers were recognized (Fig. 2). Of these, twining (51.35%) was the most prominent mode for climbing, followed by tendrilar (20.72%), straggling-unarmed (15.32%), straggling-armed (10.1%) and aerial root climbing (0.9%).

Stratification

Quite large number of climbers of the region are under lower strata (78 species) followed by middle strata with 17 species and upper strata with 9 species (Table 2). Tinospora sinensis reached the most distant canopies (29.75), among the minor woody climbers, preferably over Bombax cieba. *Combretum decandrum*, the massive liana, also reached as high as 28 m. All the 9 climbing species of the upper stratum were twiners except Antigonon leptopus, which reached a relatively lower height. Majority of the middle strata climbers were lianas. The herbaceous and less woody climbers namely Coccinia grandis, Dioscorea bulbifera, Ichnocarpus frutescens, Ipomoea quamoclit and Telosma pallida may also reach this layer through twining over Tinospora sinensis. The climbers of the lower strata layer were generally of tendrilar type. They grow over shrubby plants and various other objects luxuriantly. The twiners of the lower stratum spread over ground in absence of any support.

Few massive lianas, especially straggling-armed climbers formed thickets in different strata. The chief thicket forming species namely, *Caesalpinia bonduc*, *C. cucculata*, *C. decapetatla Calamus tenuis*, *Capparis zeylanica*, *Rosa clinophylla* and

Table 1. The number of species, genera and families of climbers and their ratio across the terrestrial landscape of north-eastern Uttar Pradesh

		Vegetation types		T T 1 1
	Grassland	Grassland Wasteland Forest		Vegetational landscape
No. of Species	34	81	83	111
No. of Genera	20	57	67	82
No. of Families	10	25	31	35
Species/genus ratio	1.7	1.4	1.2	1.4
Species/family ratio	3.4	3.2	2.7	3.2

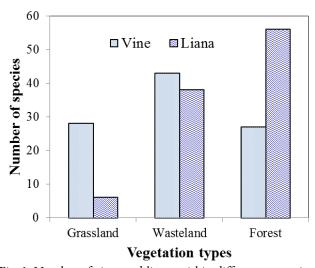


Fig. 1. Number of vines and lianas within different vegetation types

Ziziphus oenoplia constituted the lower strata. *Acacia concinna, Bridelia stipularis* and *Capparis zeylanica*, however, formed thickets and were the components of middle strata. These species often entangled with twiners and acted as a safe repository for rare plants and small mammals.

Climbing and circumnutation

All the twining and tendrilar climbers showed general pattern of handedness irrespective of the vegetation types. Of the 26 tendrilar climbers, 14 species had simple un-branched tendrils, while remaining had branched tendrils. In 9 such species the tendrils were bifid and in 3 species, namely Antigonon leptopus, Naravelia zeylanica and Trichosanthes cucumerina were trifid (Supplementary Table 2). Every tendril showed both the left-handed as well as right-handed coiling. The two species namely, Smilax perfoliata and S. zeylanica bore two simple tendrils in the axils of leaves. The growth of the bifid tendrils of *Cayratia trifolia* was typical. The branches of the tendrils of the species arise at different distances. One of the bifid branch terminates, while the other one again becomes bifid. Branching of tendril was similarly repeated up to 4th node (Fig. 3). Each terminating tendril ends into a knob like structure. The lower part of the tendrils of A. leptopus shows distinct node and internodes. The 4 nodes bent alternately on opposite sides to form a zig-zag pattern (Fig. 4A, B). Among twiners, majority of the species (91%) showed twining in righthanded direction along the support (Fig. 5A). Only in five species, namely Dioscorea bulbifera, D. echinata, D. pentaphylla, Merremia dissecta and Mikania micrantha left-handed twining was observed (Fig. 5B, Supplementary Table 3).

Commonness vs. rarity

The number and share of exclusive climber species as well as those common to grassland, wasteland and forest vegetation types has been presented in Venn diagram (Fig. 6). Twelve (12) species were exclusive to wasteland and 26 to forest vegetation. Only 4 species, namely *Ipomoea aquatica, Lathyrus aphaca, L. odoratus* and *L. sativus* were exclusive to grassland vegetation. Quite a greater number of species of climbers was common to wasteland and forest vegetation. All the three vegetation types

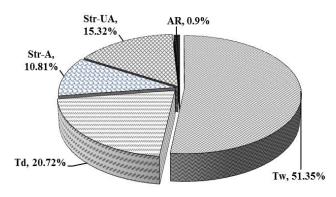


Fig. 2. The occurrence (%) of climbing species as per climbing modes within terrestrial landscape (Abbr. Tw: twining; Td: tendrilar; Str-A: straggling armed; Str-UA: straggling unarmed; AR: aerial root)

were represented by 18 common species namely, Cajanus scarabaeoides, Cayratia trifolia, Cissampelos pareira, Coccinia grandis, Cuscuta chinensis, C. reflexa, Ichnocarpus frutescens, Ipomoea cairica, I. pes-tigridis, I. quamoclit, Momordica charantia, Operculina turpethum, Oxystelma secamone, Tiliacora racemosa, Tinospora sinensis, Trichosanthes cucumerina and Trichosanthes nervifolia.

A few rare climbers occurred in only one vegetation type but some other rare ones occurred in more than one type. The rare exclusive species were *Acacia concinna, Ampelocissus*

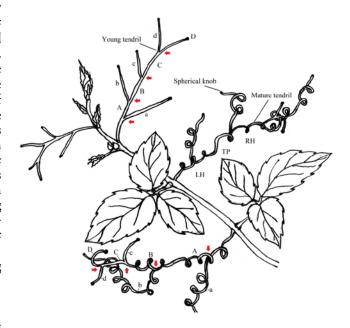


Fig. 3. The branched tendrils of Cayratia trifolia

The mature tendrils show both left- handed (LH) and right-handed (RH) coiling with point of tendril perversion (TP). The arrow indicates branching node. At each branching point, the two branches are labeled as A-a, B-b, C-c and D-d, respectively. Tendril branch 'A' bipartite to B-b branch, branch 'B' to C-c branch and eventually branch 'C' to D-d branch. The branches 'a', 'b', 'c' and 'd' remains un-branched. All branches show spherical knob like structure. The knob indicates termination of the branching. latifolia, Aristolochia indica, Ipomoea nil, Naravelia zeylanica, Spatholobus parviflorus and Vallaris solanacea. The rare species, occurring in more than one vegetation types were Abrus precatorius, Cardiospermum helicacabum, Clitoria ternatea Dioscorea pentaphylla and Gloriosa superba.

Discussion

The present study aims to examine the composition and diversity of climbers among three vegetation types with respect to their woodiness, climbing mode and circumnutation pattern. Such studies with respect to Terai landscape are still lacking. Considerable investigations have been made on the diversity of lianas of forest vegetation in India (Reddy and Parthasarathy, 2003; Parthasarathy *et al.*, 2004; Jayakumar and Nair, 2013), Recently, Aziz *et al.* (2016), observed the growth pattern of tendril in *Lagenaria sicereria*. The vines need attention especially with respect to their climbing pattern along the support.

The result indicates clear differences in the occurrence and diversity of climbers among different vegetation. The wasteland and forest vegetation were nearly similar in the composition of climbing species. Lianas were distributed in all the three vegetation but most diverse in forest vegetation. This may probably due to the greater support diameter. In absence of support, the pliable stems of the liana grow only up to the 1.5 meter in height (Putz, 1984). Lianas have to climb on trees, if not, and then they continue to grow very slowly in the low light of the understory (Putz, 1984). The anchoring strategies and stem anatomical features favours their growth over upright trees (Garrido-Perez and Burnham, 2010). Convolvulaceae was the most specious family of climbing plants as also reported from the southern Western Ghats of Coimbatore (Sarvalingan and Rajendran, 2015). Twining was the most prominent mode

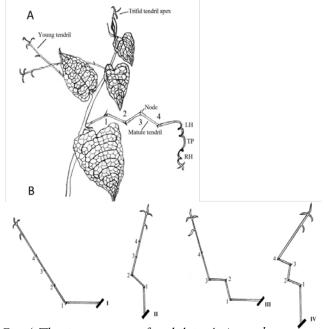


Fig. 4. The zig-zag pattern of tendrils in *Antigonon leptopus* Each tendril has four nodes. A. The twig with tendril (the young upper tendrils are without any turn). The lower mature tendril has alternate turns (1-4). B. The developmental stages of turns (I-IV) in maturing tendril. The abbreviations LH, TP and RH stand same as in figure 5

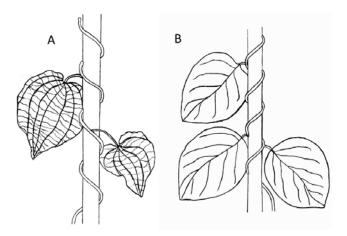


Fig. 5. The two species show their direction of twining. **A.** *Dioscorea bulbifera* stem twining in the left-hand direction and **B.** *Basella alba* stem in the right-hand direction

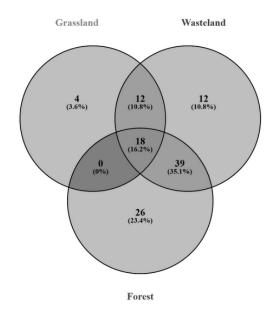


Fig. 6. The diagram showing the number of exclusive species and those common to three vegetation types

of climbing that has also been cited for other (DeWalt *et al.*, 2000; Parthasarathy *et al.*, 2004).

Stratification and thicket

Due to greater proportion of weak stems of twining, tendrilar and straggling-unarmed climbers lower strata shows maximum number of species. The species reaching to middle and upper strata were mostly lianas. In the absence of suitable support they grow with lower strata (Putz, 1984). The supports on which climbers ascend were not species-specific. They are the highest peak where a species of climber reached. Several studies demonstrated earlier that the lianas and trees are not in species-specific relation (Perez-Salicarp *et al.*, 2001; Malizia and Garau, 2006). *Tinospora sinensis* is the most frequent climbing plant of all the three vegetation types and also provides support for various herbaceous climbers like

Basella alba, Cayratia trifolia, Coccinia grandis, Ipomoea quamoclit.

Climbers also have various resource value of ecological and economic importance (Tra Bi et al., 2005; Khare, 2007; Parthasarathy et al., 2015). The straggling-armed climbers e.g., Caesalpinia bonduc, C. cucculata, C. decapetala, Calamus tenuis, Capparis zeylanica, Rosa clinophylla and Ziziphus oenoplia form dense thickets. These lower strata thickets create suitable micro-habitat for rare plant taxa like Baccopa monierii, Gloriosa superba, Helminthostachys zeylanica, Pergularia foetida, Oxystelma secamone, Rauwolfia serpentina and many other shade tolerant species as also reported by Pandey and Shukla (2003). Gonzalez-Teuber and Gianoli (2008) reported greater reproductive output in Convolvulus chilensis that were associated with thorny shrubs. These thickets are also safe house for rodents and other small mammals which provide dispersal of the plant propagules during migration from one thicket to the others. Thus, thickets provide conservation of these special micro-habitats for conservation of small species.

Circumnutation pattern

Several authors mentioned that twining handedness can be constant within a species but differ between species (Sachs, 1882; Ornduff, 1991; Hashimoto, 2002; Lubkin, 2004). However, Davis (1974) observed both the left-handed and right-handed twining stem in Mikania micrantha at different latitudes. The current results confirm the verified principle that most of the twining plants ascend their host by forming righthanded helices. We observed 93% right-handed twining. Edwards et al. (2007) reported 92.5% of the twining stem in the same direction. Though, their data on twining direction is not based at species level. Burnham and Revilla-Minaya (2011) reported 83% taxa at species level that were dextral (right handed) in direction. Our results further indicate a general pattern of twining direction irrespective of the three vegetations and similar pattern was also claimed by Edwards et al. (2007) at wide range of vegetation types and geographical location across the globe. Burnham and Revilla-Minaya (2011) reported ambidextrous twining phenomenon in members of the family Dilleniaceae. They observed stem circumnutation in one direction, and after 2-3 revolutions they further noticed the changes in direction for 2-3 revolutions in the same individuals. Darwin (1875), Dufor (1902), Ornduff (2004) also reported this reversal in handedness in several species. In the present study no such reversal was observed. The species of genus Dioscorea showed both the left-handed and right-handed direction. Baillaud (1962) also reported that the species of this genus twin either right-handed or left-handed direction.

Among tendrilar climbers, 56% had simple un-branched tendril. The branched tendrilar climbers were either bifid or trifid. The branches may provide greater probability to find support and also may give greater chance to attach on the support under disturbed environment. This may probably makes the plant very flexible to their attachment under strain. Both the left- handed and right-handed circumnutations were observed in every tendril of a species. The two directions of handedness were separated by tendril perversion in successive manner. Tendril perversion is the change in the helix structure to hemi-helix structure (Liu *et al.*, 2014). This helical coiling axially shortens the tendril, pulling the plants towards the attachment point (Gerbode *et al.*, 2012). Tendril perversion

provides quite greater flexibility than a regular coiled tendril in a plant (Aziz *et al.*, 2016). The alternate turns of mature tendrils of *Antigonon leptopus* provides additional flexibility. During external pull on plants these alternate turns become relaxed and thus conquer its detachment from the support.

To explain circumnutation, different authors have proposed different empirical and theoretical explanations such as roles of thigmotropism (Darwin and Darwin, 1881), phototropism (Sachs, 1882), geotropism (Israelsson and Johnsson, 1967; Kitazawa *et al.*, 2005), microfibril orientation in xylem (Silk and Hubbard, 1991), epidermal cell anisotropism (Hashimoto, 2002), microtubule orientation in cells (Edwards *et al.*, 2007), anatomical asymmetry (Silk and Hubbard, 1991; Bowling and Vaughn, 2009), radial stem expansion during primary growth or the growth of lateral structures (Silk and Holbrook, 2005; Isnard *et al.*, 2009).

Common, exclusive and rare climbers

It has been observed that the exclusive climber diversity increases as the complexity of the vegetation changes from grassland to wasteland, to forest. The species occurring in all the three vegetation types are also very common in the region, except *Oxystelma secamone*. Some species like *Antigonon leptopus*, *Bauhinia vahlii* are abundant and frequent climbers of wasteland and forest vegetation types, respectively. The wasteland and forest share most of the climbing species (35%) and their diversity was also quite similar. Wasteland represented suitable habitat for both the vines and lianas. This was probably due to the greater protection of their propagules and availability of support in this vegetation type.

Grassland vegetation, represented by 34 climbing species, is the most disturbed vegetation across the landscape. Several species namely, Cajanus scarabaeoides, Cayratia trifolia, Cissampelos pareira, Coccinia grandis, Ichnocarpus frutescens, Ipomoea cairica, Momordica dioica, Operculina turpethum, Teramnus labialis, Trichosanthes cucumerina and Trichosanthes nervifolia have either rhizomatous or tuberous roots or woody rootstock that is helpful in the survival and growth of these climbers in disturbed habitat. Some herbaceous climbers like Lathyrus aphaca, L. odoratus, L. sativa and Vicia hirsuta were also present as common weeds in adjacent agricultural fields. Some rare climbers occurred in one or two vegetation types. A few climbers like Oxystelma secamone, Rhynchosia minima and Spatholobus parviflorus which are quite rare in this region are, however, included in the Least Concern category of Red Data Book (Lansdown 2011; Chadburn 2012; Poveda 2012). Dioscorea deltoidea is categorized as Vulnerable in India (Nayar and Sastry, 1990).

Several climbers of grassland vegetation are known to produce secondary metabolites which repel their herbivores (Subramanayam *et al.*, 2007). These plant species have evolved traits to tolerate or resist disturbance (Diaz *et al.*, 2007 Dobarro *et al.*, 2013). A number of climbers are used locally in various ways. The aerial bulbs of *D. bulbifera* and *D. oppositifolia* are consumed as food. The leaves of *Bauhinia vahlii* are used as meal plate by rural poor. The natural ingredient of seeds of *Mucuna pruriens* (L-DOPA) is valuable in the treatment of Parkinson disease (Dymock and Warden, 1980). In past, jewellers used the seeds of *Abrus precatorius* (Ratti) as weight measures. An herbaceous climber, *Mikania micrantha*, on the

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 $Table \ 2. \ The height \ (ht) \ climbed \ by various \ climbers, grouped \ within \ upper \ strata \ (> 20 \ m), middle \ strata \ (10-20 \ m) \ and \ lower \ strata \ (< 10 \ m) \ model \ strata \ (> 20 \ m), middle \ strata \ (> 20 \ m) \ model \ strata \ (> 20 \ m) \ model \ strata \ (> 20 \ m) \ model \ strata \ (> 20 \ m) \ model \ strata \ (> 20 \ m) \ model \ strata \ (> 20 \ m) \ model \ strata \ strata$

.N.	Climbing species	Supporting plant/object	Average ht. climbe (mean ± S.E.) (m
		UPPER STRATA (> 20 m)	
1.	Antigonon leptopus	Bombax cieba	21.90 ± 12.23
2.	Bauhinia vahlii	Shorea robusta	22.46 ± 8.45
3.	Cissampelos pareira	T. sinensis-Terminalia bellerica	27.47 ± 9.93
4.	Combretum decandrum	Ailanthus excelsa	28.07 ± 8.04
5.	Scindapsus officinalis	Ficus benghalensis	24.45 ± 2.10
6.	Thunbergia grandiflora	Bombax cieba	27.43 ± 3.32
7.	Tiliacora racemosa	Terminalia hellerica	22.45 ± 3.56
8.	Tinospora sinensis	Bombax cieba	29.75 ± 2.98
9.	Ventilago maderaspatana	Terminalia bellerica	20.68 ± 4.59
		MIDDLE STRATA (10-20 m)	
		MIDDLE STRATA (10-20 III)	
1.	Acacia concinna	Shorea robusta	12.85 ± 5.20
2.	Bridelia stipularis	Adina cordifolia	12.92 ± 2.26
3.	Capparis zeylanica	Bombax cieba	12.68 ± 2.51
4.	Celastrus paniculatus	Alangium solvifolium	17.92 ± 3.87
5.	Cissus adnata	Terminalia cattapa	11.57 ± 4.44
6.	Coccinia grandis	Tinospora sinensis	12.21 ± 1.63
7.	Dalbergia volubilis	Bombax cieba	12.63 ± 2.94
8.	Derris scandens	Ailanthus excelsa	16.88 ± 2.78
9.	Dioscorea bulbifera	T. sinensis-Anthocephalus cadamba	16.56 ± 3.31
10.	Embelia ribes	Alangium solvifolium	14.83 ± 2.68
11.	Erycibe paniculata	Tectona grandis	15.90 ± 3.35
12.	Ichnocarpus frutescens	T. sinensis-Anthocephalus cadamba	16.75 ± 4.25
13.	Ipomoea quamoclit	Leucaena leucocephala	12.68 ± 1.23
	Milletia auriculata	Shorea robusta	15.50 ± 3.12
15.	Porana paniculata	Celtis australis	12.30 ± 2.03
16.	Spatholobus parviflorus	Toona ciliata	11.32 ± 2.88
17.		Tinospora sinensis	16.18 ± 3.65
		LOWER STRATA (< 10 m)	
1.	Abrus precatorius	Capparis zeylanica	8.66 ± 1.33
2.	Aganosma caryophyllata	Pongamia pinnata	3.25 ± 1.45
3.	Ampelocissus latifolia	Calamus tenuis	6.43 ± 1.23
4.	Argyreia sericea	Bushes	4.45 ± 0.56
5.	Argyreia speciosa	Bushes	9.24 ± 2.22
6.	Aristolochia indica	Bauhinia purpurea	3.25 ± 0.87
7.	Asparagus racemosus	Calamus tenuis	6.84 ± 2.53
8.	Basella alba	Ricinus communis	4.60 ± 0.56
9.	Caesalpinia bonduc	Form self thicket	7.12 ± 1.63
10.	Caesalpinia cucullata	Antidesma ghesembilla	4.20 ± 1.23
11.	Caesalpinia decapetala	Acacia concinna	9.42 ± 2.12
12.	Cajanus scarabaeoides	Tinospora sinensis	3.45 ± 2.22
13.	-	Form self thicket	5.43 ± 1.11
14.	Campsis grandiflora	Tectona grandis	9.22 ± 2.65
	Cardiospermum halicacabum	Leucaena leucocephala	2.45 ± 0.43
	Cayratia trifolia	Tinospora sinensis	4.20 ± 0.22
17.	Clematis gouriana	Ehretia aspera	5.03 ± 1.02
18.	Clerodendrum splendens	Ficus religiosa	5.89 ± 2.02
19.	Clitoria ternatea	Mimosa himalayana	2.94 ± 0.98
20.	Cocculus hirsutus	Trema orientalis	4.10 ± 1.12
20.		Morus alba	4.10 ± 1.12 3.45 ± 1.53
		Wire fence	2.21 ± 0.93
	Convolvulus arvensis		
21. 22. 23.	Convolvulus arvensis Cryptolepis dubia	Bushes	5.20 ± 1.58

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25.	Cryptostegia grandiflora	Antidesma ghesembilla	2.10 ± 1.10
26.	Cucumis trigonus	Cassia occidentalis	1.82 ± 0.87
27.	Cuscuta chinensis	Aeschynomene indica	0.57 ± 0.11
28.	Cuscuta reflexa	Mangifera indica	4.53 ± 0.65
29.	Dioscorea deltoidea	Tinospora sinensis	3.20 ± 0.69
30.	Dioscorea echinata	Cassia fistula	3.56 ± 1.03
31.	Dioscorea japonica	Bridelia squamosa	4.12 ± 1.50
32.	Dioscorea oppositifolia	Melia azadirach	5.43 ± 1.79
33.	Dioscorea pentaphylla	Flacourtia jangomas	2.23 ± 0.37
34.	Diplocyclos palmatus	Ziziphus mauritiana	3.68 ± 0.91
35.	Embelia tsjeriam-cottam	Biscofia javanica	2.80 ± 1.02
36.	Ficus heterophylla	Calamus tenuis	2.85 ± 0.97
37.	Gloriosa superba	Saccharum spontaneum	2.95 ± 0.56
38.	Hemidesmus indicus	Mallotus philippensis	3.52 ± 1.02
39.	Ipomoea aquatica	Ipomoea fistulosa	2.12 ± 1.10
40.	Ipomoea cairica	Electric pole	5.46 ± 1.11
41.	Ipomoea eriocarpa	Saccharum spontaneum	2.56 ± 1.05
42.	Ipomoea hederifolia	Cissampelos pariera-Mangifera indica	5.43 ± 1.85
43.	Ipomoea maxima	Bushes	4.62 ± 1.72
44.	Ipomoea muricata	Fence walls	2.40 ± 1.68
45.	Ipomoea nil	Fence walls	4.34 ± 1.89
46.	Ipomoca nu Ipomoca obscura	Calotropis procera	2.23 ± 1.52
47.	Ipomoea pes-tigridis	Electric pole	6.06 ± 1.50
48.	Ipomoea purpurea	Tinospora sinensis	1.98 ± 0.55
49.	Merremia dissecta	Mimosa himalayana	4.10 ± 1.23
ч <i>у</i> . 50.	Merremia hederacea	Saccharum officinarum	4.10 ± 1.25 2.52 ± 1.10
51.	Mierremia neueracea Mikania micrantha	Bushes	2.32 ± 1.10 3.34 ± 1.10
52.	Momordica charantia	Morus indica	
53.	Momoraica charanna Momordica dioica		2.32 ± 1.02 2.43 ± 0.98
		Ziziphus mauritiana Testeno menelis	
54.	Mucuna pruriens	Tectona grandis	8.24 ± 2.54
55.	Mukia maderaspatana	Capparis zeylanica	3.25 ± 1.12
56.	Naravelia zeylanica	Pithecellobium dulce	8.20 ± 1.89
57.	Operculina turpethum	Trema orientalis	4.46 ± 1.71
58.	Oxystelma secamone	Ipomoea fistulosa	2.20 ± 1.02
	Paederia foetida	Eugenia jambos	8.21 ± 3.05
60.	Passiflora foetida	Trema orientalis	3.26 ± 0.77
61.	Pentatropis spiralis	Trema orientalis	4.25 ± 0.53
62.	Pergularia daemia	Calotropis procera	1.08 ± 0.36
63.	Piper longum	Caesalpinia bonduc	3.20 ± 0.96
64.	Rhynchosia minima	Cerodendron indicum	1.23 ± 1.03
65.	Rosa clinophylla	Calamus tenuis	6.54 ± 1.98
66.	Solena heterophylla	Diospyros melanoxylon	7.68 ± 2.78
67.	Smilax perfoliata	Azadirachta indica	8.24 ± 2.56
68.	Smilax zeylanica	Streblus asper	7.78 ± 3.34
69.	Stephania japonica	Bombax cieba	8.82 ± 1.45
70.	Teramnus labialis	Caesalpinia bonduc	3.40 ± 1.26
71.	Tragia involucrata	Adhatoda vasica	2.81 ± 1.02
72.	Trichosanthes cucumerina	Shorea robusta	3.68 ± 1.23
73.	Trichosanthes nervifolia	Ziziphus oenoplia	3.37 ± 1.54
74.	Tylophora indica	Calotropis procera	1.30 ± 1.10
75.	Vallaris solanacea	Bushes	7.23 ± 2.39
76.	Wagatea spicata	Pithecellobium dulce	4.71 ± 1.58
77.	Ziziphus oenoplia	Streblus asper	3.32 ± 1.47
78.	Ziziphus xylopyrus	Ficus cunia	1.83 ± 1.06

other hand, is one of the 100 worst invasive alien species in the world (Lowe *et al.*, 2001). It has been reported as a problematic weed in the plantation forests of north-east and south-west India (Parker, 1972). Due to recurrent disturbances and degradation of forest and wastelands, most of the valuable climbers have currently become much scarce.

Conclusions

Local climbing flora provides considerable natural resource to the region. They often create special micro-habitats and increase the complexity of the ecosystem. But in recent past, recurrent disturbances in the form of habitat destruction, grazing, trampling and fire across the landscape have wiped out

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a number of climbers. The basic information on their diversity, distribution and circumnutation or climbing handedness pattern may be used to emphasize the need of their conservation at regional level.

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Supplementary files

Climber Diversity across Vegetational Landscape of North-Eastern Uttar Pradesh, India

Supplementary Table 1.

General habitat and climbing categories of climbers of north-eastern Uttar Pradesh. Vegetation (Habitat) types - G = Grassland, W = Wasteland, F = Forest. Life span- A = Annual, Per = Perennial; Climber category- L = Liana (woody climber), V = Vine (herbaceous climber); Climbing mode- Tw = Twining, Td = Tendrilar, Str-A = Straggling Armed, Str-UA = Straggling Unarmed, AR = Aerial Root

[Nomenclature according to The Plant List database (*http://www.theplantlist.org*)]

S.N.	Species	Family	Vegetation (Habitat) types	Life span	Climber category	Climbing mode
1.	Abrus precatorius L.	Papilionaceae	W, F	Per	L	Tw
2.	Acacia concinna (Willd.) DC.	Mimosaceae	F	Per	L	Str-A
3.	Aganosma caryophyllata (Roxb. ex Sims) G. Don	Apocynaceae	F	Per	L	Tw
4.	Ampelocissus latifolia (Roxb.) Planch.	Vitaceae	F	Per	L	Td
5.	Antigonon leptopus Hook. & Arn.	Polygonaceae	W	Per	V	Td
6.	Argyreia sericea Dalzell	Convolvulaceae	W	Per	L	Str-UA
7.	Argyreia speciosa (L. f.) Sweet	Convolvulaceae	W	Per	L	Str-UA
8.	Aristolochia indica L.	Aristolochiaceae	F	Per	L	Tw
9.	Asparagus racemosus Willd.	Liliaceae	F	Per	V	Tw
10.	Basella alba L.	Basellaceae	W	А	V	Tw
11.	Bauhinia vahlii Wight & Arn.	Caesalpiniaceae	F	Per	L	Td
12.	Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	W	А	V	Td
13.	Bridelia stipularis (L.) Blume	Euphorbiaceae	F	Per	L	Str-A
14.	Caesalpinia bonduc (L.) Roxb.	Caesalpiniaceae	W, F	Per	L	Str-A
15.	<i>Caesalpinia cucullata</i> Roxb.	Papilionaceae	F	Per	L	Str-A
16.	Caesalpinia decapetala (Roth) Alston	Caesalpiniaceae	W, F	Per	L	Str-A
17.	Cajanus scarabaeoides (L.) Thouars	Papilionaceae	G, W, F	А	V	Tw
18.	Calamus tenuis Roxb.	Arecaceae	F	Per	L	Str-A
19.	Campsis grandiflora (Thunb.) K.Schum.	Bignoniaceae	W, F	Per	L	Str-UA
20.	Capparis zeylanica L.	Capparidaceae	W, F	Per	L	Str-A
21.	Cardiospermum halicacabum L.	Sapindaceae	G, W	А	V	Tw
22.	Cayratia trifolia (L.) Domin	Vitaceae	G, W, F	Per	V	Td
23.	Celastrus paniculatus Willd.	Celastraceae	F	Per	L	Tw
24.	Cissampelos pareira L.	Menispermaceae	G, W, F	Per	L	Tw
25.	Cissus adnata Roxb.	Vitaceae	W, F	Per	L	Td
26.	Clematis gouriana Roxb. ex DC.	Ranunculaceae	W, F	Per	L	Tw
27.	Clerodendrum splendens G.Don	Verbenaceae	W, F	Per	L	Tw
28.	Clitoria ternatea L.	Papilionaceae	W, F	Per	L	Tw
29.	Coccinia grandis (L.) Voigt	Cucurbitaceae	G, W,F	А	V	Td
30.	Cocculus hirsutus (L.) W. Theob.	Menispermaceae	W	Per	L	Tw
31.	Cocculus trilobus (Thunb.) DC.	Menispermaceae	W	Per	L	Tw
32.	Combretum decandrum Jacq.	Combretaceae	F	Per	L	Str-UA
33.	Convolvulus arvensis L.	Convolvulaceae	W, F	А	V	Tw
34.	Cryptolepis dubia (Burm.f.) M. R. Almeida	Asclepiadaceae	W, F	Per	L	Str-UA
35.	Cryptolepis elegans Wall. ex G.Don	Asclepiadaceae	W, F	Per	L	Str-UA

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47.DiscoverageW, FPerLTu48.Diplocytor pubmatri. (L) C. JeffreyCasurbiancaeW, FPerLSr-UA50.Endefa fore Burn. I.MyrsinacaeW, FPerLSr-UA51.Endefa fore Burn. I.MyrsinacaeW, FPerLSr-UA52.Ficu betrainfulle. I.M. BailyConvolvalucesFPerI.Tw53.Glarisan uprefut. I.LiliaceaeW, FPerLTw54.Hondenum indium (L). R. re. schult.AskepiadaceaeW, FPerLTw55.Homeserga future (L). W. T. KonApocycnaceaeG. W. FPerLTw56.Ipomose signific Forsk.ConvolvalaceaeG. W. AVTw57.Ipomose signific Forsk.ConvolvalaceaeG. W. AVTw58.Ipomose inderightal. L.ConvolvalaceaeG. W. AVTw59.Ipomose inderightal.ConvolvalaceaeG. WAVTw60.Ipomose inderightal.ConvolvalaceaeG. W. AVTw61.Ipomose inderightal.ConvolvalaceaeG. W. AVTw63.Ipomose inderightal.ConvolvalaceaeG. W. FAVTw64.Ipomose inderightal.ConvolvalaceaeG. W. FAVTw65.Ipomose inderightal.ConvolvalaceaeG. W. FAVTw66.Ipomose inderightal.		v .					
48. Diployder pathamu (L) Cleftery Coundrinces W, F A V Td 49. Exolidate idea Barm.L. Myrsinaceae W, F Per L StUA 51. Exolidate idea Barm.L. Myrsinaceae W, F Per L StUA 51. Exoleta idea transmitter. Maley Convolvates F Per L StUA 52. Fina steringhills L1. Morreces F Per L StUA 53. Globrina angerla L. Lillaceae W, F A V Td 54. Homoorpacification (L) R. R. excNut. Asclepidatecae W, F Per L Tw 55. Homoorpacification (L) R. R. excNut. Asclepidatecae G, W, F Per L Tw 56. Homoorpacification (L) St. R. excNut. Convolvataceae G, W, F Per L Tw 56. Homoorpacification (L) St. Convolvataceae G, W, F A V Tw 58. Ipomote atomical (L) Store Convolvataceae G, W, F A V Tw 58. Ipomote atomical (L) Store Convolvataceae G, W, F A V Tw 59. Ipomote atomical (L) Store Convolvataceae G, W, F A V Tw 59. Ipomote atomical (L) Store Convolvataceae G, W, A V Tw 59. Ipomote atomical (L) Store Convolvataceae G, W A V Tw 59. Ipomote atomical (L) Store Convolvataceae G, W A V Tw 50. Ipomote atomical (L) Store Convolvataceae G, W A V Tw 50. Ipomote atomical (L) Store Convolvataceae G, W A V Tw 50. Ipomote atomical (L) Store Convolvataceae G, W A V Tw 50. Ipomote atomical (L) Store Convolvataceae G, W, F A V Tw 50. Ipomote atomical (L) Store Convolvataceae G, W, F A V Tw 50. Ipomote atomical (L) Store Convolvataceae G, W, F A V Tw 50. Ipomote appropria (L) Roth Convolvataceae G, W, F A V Tw 50. Ipomote appropria (L) Roth Convolvataceae G A V Td 50. Ipomote appropria (L) Roth Convolvataceae G A V Td 50. Ipomote appropria (L) Roth Convolvataceae G A V Td 50. Ipomote appropria (L) Roth Convolvataceae G A V Tw 77. Moteronadouteae Isophica L Convolvataceae G A V Tw 77. Moteronadouteae Isophica L Convolvataceae G A V Tw 77. Moteronadouteae Isophica L Convolvataceae G A V Tw 77. Moteronadouteae Isophica L Convolvataceae G A V Tw 77. Moteronadouteae Isophica L Convolvataceae G A V Tw 77. Moteronadouteae Isophica L Convolvataceae G, W, F A V Tw 77. Moteronadouteae Isophica L Convolvataceae G A V Td 74. Morronadouteae Isophica L Convolvataceae G,							
99.Imbidia rightmonthement.MyristiaceaeW, FPerI.Struct A51.Enyclet puniculata F.M. BalleyConvolvulaceaeFPerI.Struct A52.Fism basempholitL.B.MoraceaeFPerI.Struct A53.Glorinous appeholitL.LilasceaeW, FAVTd54.Honologues appeholitStruct AAsselphalaceaeW, FPerLTw55.Irbanoerspir pistexei (L.) W. T. KitonApocymaceaeGAVStruct A56.Irbanoerspir pistexei (L.) W. T. KitonApocymaceaeGAVTw57.Irbanoerspir pistexei (L.) W. T. KitonApocymaceaeG, WAVTw58.Irbanoes appartic (L.) SteveConvolvulaceaeG, WAVTw59.Irbanoes appartic (L.) SteveConvolvulaceaeG, WAVTw60.Irbanoes appartic (L.) SteveConvolvulaceaeG, WAVTw61.Irbanoes appartic (L.) SteveConvolvulaceaeG, WAVTw63.Irbanoes appartic (L.) SteveConvolvulaceaeG, WAVTw64.Irbanoes appartic (L.) SteveConvolvulaceaeG, W, FAVTw65.Irbanoes appartic (L.) SteveConvolvulaceaeG, W, FAVTw66.Irbanoes appartic (L.)ConvolvulaceaeG, W, FAVTw <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
50.Embels triprine portuge portuge schemel, ADC.MyrsinaccacW, FPerLSn-UA51.Eryctle ponticidat F.M. BaileyConvolvalaccacFPerLSn-UA52.Films theraphylla L4.LallaccacW, FAVTd53.Glorious superlo L1, B. E., eSchult,AsclepiablecaeW, FAVTd54.Hemidennui indicaz (L), B. R., eSchult,AsclepiablecaeG, W, FAVTu-V55.Infonces origin function (L) W.T. AitonApocynacca:G, W, FAVTu-V58.Ipomose aparita Forsak,ConvolvulaccaeG, WAVTw59.Ipomose origin R, Br.ConvolvulaccaeG, WAVTw60.Ipomose origin (L) NettConvolvulaccaeG, WAVTw61.Ipomose origin (L) RothConvolvulaccaeG, WAVTw63.Ipomose origin (L) RothConvolvulaccaeG, W, FAVTw64.Ipomose origin (L) RothConvolvulaccaeG, W, FAVTw65.Ipomose origin (L) RothConvolvulaccaeGAVTw66.Iaditym ophota L.PapilionaccaeGAVTw71.Merronis dustrati L.PapilionaccaeGAVTw73.Milletia survisativa L.PapilionaccaeGAVTw74.Mornorida constabato, Explified L<							
1.Eryche paniculata F.M. BalleyConvolvulaceaeFPerLTw52.Ficin hetrophylle L.f.MoraceaeFPerLStruth53.Glorious appehe L.LiliaceaeW.FAVTd54.Homidennis indica (L) R. B. ex Schult.AsclepiadaceaeW.FPerLTw55.Ielonoarapia firsterosk.ConvolvulaceaeGAVStruth57.Ipomoes aparitie Forsk.ConvolvulaceaeG, W.FAVTw58.Ipomoes directopa R.B.ConvolvulaceaeG, WAVTw59.Ipomoes directopa R.B.ConvolvulaceaeG, WAVTw60.Ipomoes miricat (L) Jacq.ConvolvulaceaeG, WAVTw61.Ipomoes miricat (L) Jacq.ConvolvulaceaeG, WAVTw63.Ipomoes prigridi LConvolvulaceaeG, W.FAVTw64.Ipomoes prigridi LConvolvulaceaeG, W.FAVTw65.Ipomoes prigridi LPapilonaceaeGAVTw66.Ipomoes prigridi LPapilonaceaeGAVTw70.Merromis disecta (Jacq) Hallier f.ConvolvulaceaeGAVTw71.Merromis disecta (Jacq) Hallier f.ConvolvulaceaeW,FAVTw72.Midaliaa auriadata diaer.PapilionaceaeGW,FAVT							
52.Fine heterophyllk L.f.MonaccaeFPerLSr. UA53.Glottas ngoba L.LLiliaceaeW, FAVTd54.Homiotania ninkoza (L) R. Br. es Schult,AckelpialaccaeW, FAVTw55.Ichnoortiga futscore (L) W. T. AitonApocynaceaeGAVSte-UA57.Ipomosa caria (L) SweetConvolvulaceaeG, W, FAVTw58.Ipomosa caria (L) SweetConvolvulaceaeG, WAVTw60.Ipomose nextrina (L) Lon C Sov.ConvolvulaceaeG, WAVTw61.Ipomose nextrina (L) Lon C Sov.ConvolvulaceaeG, WAVTw62.Ipomose nextrina (L) RechConvolvulaceaeG, WAVTw63.Ipomose nextrina (L) RechConvolvulaceaeG, WAVTw64.Ipomose nextrina (L) RechConvolvulaceaeG, W, FAVTw65.Ipomose nextrina (L) RechConvolvulaceaeG, W, FAVTw66.Ipomose nextrina (L) RechConvolvulaceaeG, W, FAVTw67.Ladynu sobrata L.PapilonaceaeGAVTw68.Ladynu sobrata L.PapilonaceaeGAVTw69.Ladynu sobrata L.PapilonaceaeG, W, FAVTw71.Meremin distesta (Jace) Haller f.Convolvulaceae <td< td=""><td></td><td></td><td>•</td><td></td><td></td><td></td><td></td></td<>			•				
53. Genins: openal. I. Liliccae W.F. A V Td 54. Hemidemus indics (L) R. R. excEvhult. Asclepiadaccae W.F. Per I. Tw 55. Ihomaryu finisteen (L) W.T. Aiton Apcograceae G. W. F. Per I. Tw 56. Ipomese anyatica Forsik. Convolvulaceae G. W. F. A V Tw 57. Ipomese tokerighta L. Convolvulaceae G. W. A V Tw 60. Ipomese tokerighta L. Convolvulaceae G. W. A V Tw 61. Ipomese tokerighta L. Convolvulaceae G. W. A V Tw 62. Ipomese maxima (L) Roth Convolvulaceae G. W. A V Tw 63. Ipomese pripried L. Convolvulaceae G. W. F. A V Tw 64. Ipomese pripried L. Convolvulaceae G. W. F. A V Tw 65. Ipomese pripried L. Convolvulaceae G. W. F. A V Tw 66. Ipomese pripried L. Convolvulaceae G. W. F. A V Tw 67. Lathyrus aphasa L. Papilionaceae G A V Td 68. Lathyrus							
55. Idmnarpus frutescus (L.) W.T. Aiton Apscynaccae G. W. F. Per L Tw 56. Ipmme aguatic forsik. Convolvulacea G. A. V Str-UA 57. Ipmme aguatic forsik. Convolvulacea G. W. A. V Tw 58. Ipmmes maxima (L. D.) Don ex Sw. Convolvulacea G. W. A. V Tw 60. Ipmmes maxima (L. J.) Don ex Sw. Convolvulacea G. W. A. V Tw 61. Ipmmes muticata (L.) Jacq. Convolvulacea G. W. A. V Tw 62. Ipmmes prigrats (L.) Roth Convolvulacea G. W. A. V Tw 65. Ipmmes prigrats (L.) Roth Convolvulacea G. W. F. A. V Tw 65. Ipmmes prigrats (L.) Roth Convolvulacea G. W. F. A. V Tw 66. Ipmmes prigrats (L.) Rotholucea G. W. F. A. V Tw 67. Lathypus obratu L. Papilionacea G. A. V Td 68. Lathypus obratu L. Papilionacea G. A. V Td 70. Merenia bedrataca (Burn, I) Hallier f. Convolvulacea W. F. A. V	53.		Liliaceae	W, F	А	V	
55. Idmacrapt fratescent (L.) W.T. Airon Apocynaccae G. W. F. Per L Tw 56. Ipomoes atriatica Forsuk. Convolvulaceae G. W. F. A V Tw 57. Ipomoes atrianatica Forsuk. Convolvulaceae G. W. A V Tw 58. Ipomoes during (L.) Don et Sw. Convolvulaceae G. W. A V Tw 60. Ipomoes maxima (L.) Jacq. Convolvulaceae G. W. A V Tw 61. Ipomoes maxima (L.) Jacq. Convolvulaceae G. W. A V Tw 63. Ipomoes maxima (L.) Roth Convolvulaceae G. W. F A V Tw 64. Ipomoes prigridi 1. Convolvulaceae G. W. F A V Tw 65. Ipomoes prigridi 1. Convolvulaceae G. W. F A V Tw 66. Ipomoes prigridi 1. Convolvulaceae G. W. F A V Tw 67. Lathypus obratu L. Papilonaceae G. W. F A V Tw 68. Lathypus obratu L. Papilonaceae G. A V Td 70. Merrenia duceta (Burn, I) Hallier f. Convolvulaceae W, F A V <td>54.</td> <td>Hemidesmus indicus (L.) R. Br. ex Schult.</td> <td>Asclepiadaceae</td> <td>W, F</td> <td>Per</td> <td>L</td> <td>Tw</td>	54.	Hemidesmus indicus (L.) R. Br. ex Schult.	Asclepiadaceae	W, F	Per	L	Tw
57. $Ipomese tairisci (L)$ SweetConvolvulaceseG, W, FAVTw58. $Ipomese tristarpa R$ Br.ConvolvulaceseG, WAVTw59. $Ipomese tristar (L)$ Don cx Sw.ConvolvulaceseG, WAVTw60. $Ipomese maxima (L)$ Don cx Sw.ConvolvulaceseG, WAVTw61. $Ipomese maxima (L)$ SuchConvolvulaceseG, WAVTw62. $Ipomese miritat (L)$ SuchConvolvulaceseG, WAVTw63. $Ipomese sitting L$.ConvolvulaceseG, WAVTw64. $Ipomese quanuclit L$ ConvolvulaceseG, W, FAVTw65. $Ipomese quanuclit L$ ConvolvulaceseG, AVTw66. $Ipomese quanuclit L$ PapilionaceseGAVTd67.Lathyrus solvaris LPapilionaceseGAVTd70.Merremia disceta (Barn, E) Hallier F.ConvolvulaceaeW, FAVTw71.Merremia disceta (Barn, E) Hallier F.ConvolvulaceaeW, FAVTw73.Milletia anticatala Baker,PapilionaceaeG, W, FPerLTd74.Macana purices (L) DC.PapilionaceaeG, W, FAVTw75.Momoride discia Rock cx Wild.CucurbitaceaeW, FAVTd76.Macana purices (L) DC.Papilionaceae <td< td=""><td>55.</td><td></td><td>Apocynaceae</td><td>G, W, F</td><td>Per</td><td>L</td><td>Tw</td></td<>	55.		Apocynaceae	G, W, F	Per	L	Tw
58. Ipomoca criscipal R.Br. Convolvulacate G, W A V Tw 59. Ipomoca maricata (L.) Jacc, Convolvulacate G, W A V Tw 60. Ipomoca maricata (L.) Jacc, Convolvulacate G, W A V Tw 61. Ipomoca maricata (L.) Jacc, Convolvulacate G, W A V Tw 62. Ipomoca maricata (L.) Ker Gavl. Convolvulacate G, W A V Tw 63. Ipomoca postgridis L. Convolvulacate G, W A V Tw 65. Ipomoca quamochi L. Convolvulacate G, W Per V Tw 66. Lathyns aphata L. Papilionaccate G A V Td 67. Lathyns aphata L. Papilionaccate G A V Tw 68. Lathyns aphata L. Papilionaccate G A V Tw 71. Merrensi aburcat (Jacq). Hallier f. Convolvulacate W, F A V Tw 73. Mikliani anicnathak Raker.	56.	Ipomoea aquatica Forssk.	Convolvulaceae	G	А	V	Str-UA
59.1 pomoes hederifolia LConvolvulaceaeG. WAVTw60. <i>Ipomoes maxima</i> (L. J. Don ex Sw. <i>Ipomoes mixtat</i> (L.) Locq. <i>Ipomoes ant</i> (L.) RochConvolvulaceaeG, WAVTw62. <i>Ipomoes ant</i> (L.) RochConvolvulaceaeG, WAVTw63. <i>Ipomoes apsentia</i> (L.) RochConvolvulaceaeG, WAVTw64. <i>Ipomoes apsentig</i> (L.)ConvolvulaceaeG, WPVTw65. <i>Ipomoes quamolit</i> L.ConvolvulaceaeG, W, FAVTw66. <i>Ipomoes quamolit</i> L.ConvolvulaceaeG, AVTd67.Lathyrus obrata L.PaplionaceaeGAVTd69.Lathyrus obratas L.PaplionaceaeGAVTw71.Merremia discata (Iacq.) Hallier f.ConvolvulaceaeW, FAVTw72.Milletia aniculata Baker.PaplionaceaeG, W, FAVTw73.Milletia aniculata Baker.PaplionaceaeG, W, FAVTw74.Momoria dioica Roxb. cx Wild.CucurbitaceaeG, W, FAVTd75.Momoria dioica Roxb. cx Wild.CucurbitaceaeG, W, FAVTd76.Musuap priverius (L.) DC.RannuculaceaeG, W, FAVTd77.Makia madrapapatana (L.) M. Roem.CucurbitaceaeG, W, FAVTw <trr< tr="">7</trr<>	57.	Ipomoea cairica (L.) Sweet	Convolvulaceae	G, W, F	А	V	Tw
60.Ipomea maxima (L, É) Don ex Sw.ConvolvulaceaeG, WAVTw61.Ipomoea maritati (L) Jacq.ConvolvulaceaeG, WAVTw62.Ipomoea obcara (L) Ker Gawl.ConvolvulaceaeG, WAVTw63.Ipomoea postigridis LConvolvulaceaeG, W, FAVTw64.Ipomoea postigridis LConvolvulaceaeG, W, FAVTw65.Ipomoea quamotir LConvolvulaceaeG, W, FAVTw66.Ipomoea quamotir LConvolvulaceaeGAVTd67.Lathyrus obtaat L.PapilionaceaeGAVTd68.Lathyrus obtaat L.PapilionaceaeGAVTw70.Merremia discut (Jacq) Hallier f.ConvolvulaceaeW, FAVTw71.Merremia discut (Jacq) Hallier f.ConvolvulaceaeW, FAVTw73.Mikleina micnanha KunthAsteraceaeW, FAVTw74.Momordica dorantia LCucurbinaceaeG, WAVTd75.Memoritica doria Roch cxWilld.CucurbinaceaeW, FAVTw76.Musoia micrantha KunthAsteraceaeW, FAVTd77.Mikkana micrantha KunthCucurbinaceaeG, WAVTd78.Memoritica doria Roch cxWilld.CucurbinaceaeW, FA </td <td>58.</td> <td>Ipomoea eriocarpa R. Br.</td> <td>Convolvulaceae</td> <td>G, W</td> <td>А</td> <td>V</td> <td>Tw</td>	58.	Ipomoea eriocarpa R. Br.	Convolvulaceae	G, W	А	V	Tw
61. Ipomoea muricata (L.) Jacq. Convolvulaceae G. W. A. V. Tw. 62. Ipomoea mil (L.) Both Convolvulaceae W. A. V. Tw. 63. Ipomoea mil (L.) Both Convolvulaceae G.W. A. V. Tw. 64. Ipomoea parpuret (L.) Both Convolvulaceae G.W. F. A. V. Tw. 65. Ipomoea quamodit L. Convolvulaceae G.W. F. A. V. Tw. 66. Ipomoea quamodit L. Convolvulaceae G.W. F. A. V. Td. 67. Lathyrus odoratisu L. Papilionaceae G. A. V. Td. 69. Lathyrus intirus L. Papilionaceae W. F. A. V. Tw. 71. Merremia disseta [Locq.) Hallier f. Convolvulaceae W. F. A. V. Tw. 72. Miketia auriculata Buker. Papilionaceae W. F. A. V. Tw. 73. Miketia austrapattaria L. Cucurbitaceae W. F. A. V. Td. 74. Momoritic charantis L.				G, W	А	V	Tw
62. Ipomaes nil (L.) Roth Convolvulaceae W A V Tw 63. Ipomaes picingials Convolvulaceae G, W, F A V Tw 64. Ipomaes picingials Convolvulaceae G, W, F A V Tw 65. Ipomaes purpares (L.) Roth Convolvulaceae G, W, F A V Tw 66. Ipomaes apurpares (L.) Roth Convolvulaceae G, W, F A V Tw 67. Lathyrus advasta Papilionaceae G A V Td 68. Lathyrus otheratus Papilionaceae G A V Tw 70. Merremia isostat (Jacc), Hallier f. Convolvulaceae W, F A V Tw 71. Merremia isostat lacch, Hallier f. Convolvulaceae W, F A V Tw 72. Mikania micrantus Kunth Asteraceae W, F A V Tw 73. Momorica charantia L. Cucurbitaceae G, W, F A V Tw 74. Momorica charantia L. <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td>		-					
63. Ipomea documa (L) Ker Gawl. Convolvulaceae G, W A V Tw 64. Ipomoa pripring (L) Roth Convolvulaceae G, W Per V Tw 65. Ipomoa pripring (L) Roth Convolvulaceae G, W, F A V Tw 66. Ipomoa quamodit I. Convolvulaceae G, W, F A V Tw 67. Lathyrus phasa L Papilionaceae G A V Td 68. Lathyrus odoratio L Papilionaceae G A V Td 70. Merrenia disseta (Jaco, Hallier f. Convolvulaceae W, F A V Tw 71. Mikenia micrautha Kunch Asteraceae W, F A V Tw 73. Mikletia auriculata Baker, Papilionaceae G, W, F Per V Td 75. Momordia dioia Roxh ex Wilkl. Cucurbitaceae G, W, F A V Tw 76. Mucuna pririens (L) DC. Papilionaceae W, F A V Td 77. Mikia maderespla							
64.Ipomoea parpared (L) RothConvolvulaceaeG, W, FAVTw65.Ipomoea parpared (L) RothConvolvulaceaeG, W, FAVTw66.Ipomoea quamocii LConvolvulaceaeG, W, FAVTw67.Lathyrus aphaca L.PapilionaceaeGAVTd68.Lathyrus aphaca L.PapilionaceaeGAVTd69.Lathyrus atinus L.PapilionaceaeGAVTw70.Merrenia belerace (Burm, f.) Hallier f.ConvolvulaceaeW, FAVTw71.Merrenia belerace (Burm, f.) Hallier f.ConvolvulaceaeW, FAVTw73.Milletia auriculata Baker.PapilionaceaeFPerLStrUA74.Momoridia chosta cwWildt.CacurbitaceaeG, W, FAVTd75.Maemoridia chosta cwWildt.CacurbitaceaeG, W, FAVTd76.Macmarpuriens (L) DC.PapilionaceaeW, FAVTd78.Naraene scylaniae (L) DC.RanuculaceaeG, W, FAVTw80.Ocystelma sceamore K, Schum.AsclepiadaceaeG, W, FAVTw81.Padeira fortida LRubiceaeW, FAVTw83.Pentatropi spiralis (Fox). Druce.AsclepiadaceaeW, FAVTw84.Porgularia destrini (Forsk). Chiov.As							
65. Iponear purpured (L.) Roth Convolvulaceae G, W. Per V Tw 66. Iponear guarmodit L. Convolvulaceae G, W. F A V Td 67. Lathyrus aphaca L. Papilionaceae G A V Td 68. Lathyrus situs L. Papilionaceae G A V Td 69. Lathyrus situs L. Papilionaceae G A V Td 70. Merremia disecta (Jacq.) Hallier f. Convolvulaceae W, F A V Tw 71. Mikenia micrantha Kunth Asteraceae W, F A V Tw 73. Milletia auriculata Baker. Papilionaceae G, W, F Per V Td 75. Momordica Roxb. ex Wildl. Cucurbitaceae G, W, F A V Td 76. Mucana puriens (L.) DC. Papilionaceae W, F A V Td 77. Makiam adexapatana (L.) M. Roem. Cucurbitaceae G, W, F A V Tw 78. Naravelia zeylanics (L.) DC.		-					
66. Iponoa quamicit L. Convolvulaceae G. W. F A V Tw 67. Lathyrus aphata L. Papilionaceae G A V Td 68. Lathyrus aphata L. Papilionaceae G A V Td 69. Lathyrus atinus L. Papilionaceae G A V Td 70. Merremia bederacea (Burm. f.) Hallier f. Convolvulaceae W. F A V Tw 71. Merremia bederacea (Burm. f.) Hallier f. Convolvulaceae W. F A V Tw 73. Milletia auriculata Baker. Papilionaceae F Per L Str UA 74. Momorilca dorica charantia L. Cucurbitaceae G, W. F A V Td 75. Momorilca dorica charantia L. Cucurbitaceae G, W. F A V Td 76. Mucuna prarien (L.) DC. Ranuculaceae F Per L Td 77. Mukia anderaspatama (L.) M. Roem. Cucurbitaceae G, W. F A V Tw 78.							
67. Lathyrus aphaca L. Papilionaccae G A V Td 68. Lathyrus odoratus L. Papilionaccae G A V Td 69. Lathyrus satiwus L. Papilionaccae G A V Td 70. Merremia bideracea (Burm. f.) Hallier f. Convolvulaccae W, F A V Tw 71. Merremia bideracea (Burm. f.) Hallier f. Convolvulaccae W, F A V Tw 73. Milknia micrautha Baker. Papilionaccae G W A V Tw 74. Momordica divita notsh tas Baker. Papilionaccae G, W, F A V Td 75. Momordica divita notsh cs Willd. Cucurbitaceae G, W, F A V Td 76. Mucuna purriers (L.) DC. Papilionaccae W, F A V Td 77. Mukia mideraspatana (L.) M. Roem. Cucurbitaceae W, F A V Tw 78. Operculina turpethum (L.) Silva Manso Convolvulaccae G, W, F A V Tw							
68. Lathyrus odoratus L. Papilionaceae G A V Td 69. Lathyrus striuu L. Papilionaceae G A V Td 70. Merremis dissecta (Jacq) Hallier f. Convolvulaceae W, F A V Tw 71. Mikania micrantha Kunth Asteraceae W, F A V Tw 72. Mikania micrantha Kunth Asteraceae W, F A V Tw 73. Milletia auriculata Baker. Papilionaceae G, W, F A V Td 74. Momorica diora Roxb, ex Wildl. Cucurbitaceae G, W A V Td 75. Momorica diora Roxb, ex Wildl. Cucurbitaceae W, F A V Td 76. Mucuna pruriens (L.) DC. Papilionaceae W, F A V Td 78. Naravelia seplania (L.) M. Roem. Cucurbitaceae G, W, F A V Tw 80. Ozystelma seemone K. Schum. Aselepiadaceae W, F A V Tw 81. Pretatropis spirali (F							
69.Lathyrus sativus L.PapilionaceaeGAVTd70.Merremia dissets (Jacq.) Hallier f.ConvolvulaceaeW, FAVTw71.Merremia hedracea (Burm, f.) Hallier f.ConvolvulaceaeW, FAVTw72.Mikhnia micrantho KunthAsteraceaeW, FAVTw73.Milleia auriculata Baker.PapilionaceaeFPerLStr-UA74.Momordica charantia L.CucurbitaceaeG, W, FAVTd75.Momordica dioira Roxb. ex Wild.CucurbitaceaeG, WALTw76.Mucuna prurieus (L.) DC.PapilionaceaeWALTw77.Mukia maderaspatana (L.) M. Roem.CucurbitaceaeG, W, FAVTd78.Naravelia zcylanica (L.) DC.RanunculaceaeG, W, FAVTw79.Operacilina turpethum (L.) Silva MansoConvolvulaceaeG, W, FAVTw80.Ozystebma secamone K. Schum.AsclepiadaceaeG, W, FAVTw81.Paetariopi spiralis (Fox.) Druce.AsclepiadaceaeW, FAVTw83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeW, FPerLTw84.Pergularia daemia (Forsk) Chiov.AsclepiadaceaeW, FPerLTw85.Piper longom L.PiperaceaeFPerLStr-UA86.Por			*				
70.Merremia disceta (Jacq.) Hallier f.ConvolvulaceaeW, FAVTw71.Merremia bederacea (Burm. f.) Hallier f.ConvolvulaceaeW, FAVTw72.Mikania micrantha KunthAsteraceaeW, FAVTw73.Milicia auriculata Baker.PapilionaceaeFPerLStr. UA74.Momordica charantia L.CucurbitaceaeG, WAVTd75.Momordica charantia L.CucurbitaceaeG, WAVTd76.Mucuna prurieus (L.) DC.PapilionaceaeWALTw77.Mukia maderaspatana (L.) M. Roem.CucurbitaceaeG, W, FAVTd78.Naravelia zeylanica (L.) DC.RanunculaceaeFPerLTd79.Operculina turpethum (L.) Silva MansoConvolvulaceaeG, W, FAVTw80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FALTw81.Paederia fortida L.RubiaceaeW, FAVTw84.Penetaropis spiralis (Fox.) Druce.AsclepiadaceaeW, FPerLTw85.Piper longum L.PiperaceaeFPerLTw86.Porsana paniculata Rosb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeFPerLTw88.Rost cinophylla Redout & ThoryRosa			-				
71. Merremia hederacea (Burm. f.) Hallier f. Convolvulacea W, F A V Tw 72. Mikania micrantha Kunth Asteraceae W, F A V Tw 73. Milletia auricantha Kunth Asteraceae W, F A V Tw 73. Milletia auricantha Kunth Asteraceae G, W, F Per L Str-UA 74. Momordica charantia L Cucurbitaceae G, W A V Td 75. Momordica divida Roxb, ex Willd. Cucurbitaceae G, W A V Td 76. Mucuna privriens (L.) DC. Papilionaceae W, F A V Td 77. Mukia maderizapatana (L.) DC. Ranunculaceae G, W, F A V Td 78. Naravelia scylanica (L.) DC. Ranunculaceae G, W, F A L Tw 80. Ozystelma securone K. Schum. Asclepiadaceae W, F A L Tw 81. Paetariopis privila [Cox). Druce. Asclepiadaceae W, F Per L StrtuA <t< td=""><td></td><td>-</td><td>*</td><td></td><td></td><td></td><td></td></t<>		-	*				
72.Mikania micrantha KunthAsteraceaeW, FAVTw73.Milletia uniculata Baker.PapilionaceaeFPerLStr-UA74.Momordica charantia L.CucurbitaceaeG, W, FPerVTd75.Momordica dioira Roxb. ex Willd.CucurbitaceaeG, WAVTd76.Mucuna pruriens (L.) DC.PapilionaceaeWALTw77.Mukia maderaspatana (L.) M. Roem.CucurbitaceaeW, FAVTd78.Naravelia zeylanica (L.) DC.RanunculaceaeG, W, FAVTd79.Operculana turpehum (L.) Silva MansoConvolvulaceaeG, W, FALTw80.Oxystelma secamone K. Schum.AsclepiadaceaeW, FAVTw81.Paederia foetida L.RubiaceaeW, FAVTd83.Pentatropis spiralis (Fox) Druce.AsclepiadaceaeW, FPerLStr-UA84.Pergularia daemia (Forssk.) Chiov.AsclepiadaceaeW, FPerLStr-UA85.Piper longum L.PiperiaceaeG, WAVTw88.Rosa alimophylla Robut & ThoryRosaceaeFPerLAR90.Sinilax zeylanisica L.SmilaceaeFPerLAR91.Smilax sepfoitat Lour.SmilaceaeFPerLAR92.Solena beterophylla Robut & ThoryRosaceae <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
74.Momordica charantia L.CucurbitaceaeG, W, FPerVTd75.Momordica dioica Roxb, ex Wild.CucurbitaceaeG, WAVTd76.Mucuna pruriens (L.) DC.PapilionaceaeWALTw77.Mukia maderaspatana (L.) M. Roem.CucurbitaceaeW, FAVTd78.Naravelia zcylanica (L.) DC.RanunculaceaeFPerLTd79.Operculina turpethum (L.) Silva MansoConvolvulaceaeG, W, FAVTw80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FALTw81.Paederia foetida L.RubiaceaeG, W, FAVTd82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeW, FPerLTw84.Pergularia daemia (Forsk.) Chiov.AsclepiadaceaeW, FPerLTw85.Piper longum L.PiperaceaeFPerLTw86.Porana paniculata Roxb.ConvolvulaceaFPerLTw89.Scindapus officinalis (Roxb.) SchottAraceaeFPerLA90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax perfoliata Lour.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, F	72.		Asteraceae	W, F	А	V	Tw
75.Momordica dioica Rxb. ex Wild.CucurbitaceaeG, WAVTd76.Mucuna pruriens (L.) DC.PapilionaceaeWALTw77.Mukia maderazpatana (L.) M. Roem.CucurbitaceaeW, FAVTd78.Naravelia zeylanica (L.) DC.RanunculaceaeFPerLTd79.Operculina turperbum (L.) Silva MansoConvolvulaceaeG, W, FAVTw80.Oxystelma secamore K. Schum.AsclepiadaceaeG, W, FALTw81.Paederia foetida L.RubiaceaeW, FALTw83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeWAVTw84.Pergularia daemia (Forsk). Chiov.AsclepiadaceaeW, FPerLTw85.Piper longum L.PiperaceaeFPerLTw86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLAR90.Sindapsus officinalis (Roxb). SchottAraceaeFPerLTd91.Sindapsus officinalis (Roxb). SchottAraceaeFPerLTd93.Spatholobus parviflorus (DC.). KuntzePapilionaceaeG, WFAVTw94.Stephania japoniia (Thunb	73.	Milletia auriculata Baker.	Papilionaceae	F	Per	L	Str-UA
76.Mucuna puriters (L.) DC.PapilionaceaeWALTw77.Mukia maderaspatana (L.) M. Roem.CucurbitaceaeW, FAVTd78.Naravelia zcylanica (L.) DC.RanunculaceaeFPerLTd79.Operculina turpethum (L.) Silva MansoConvolvulaceaeG, W, FAVTw80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FALTw81.Paederia foetida L.RubiaceaeW, FAVTd83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeW, FAVTw84.Pergularia daenia (Forssk.) Chiov.AsclepiadaceaeW, FPerVTw85.Piper longum L.PiperaceaeFPerLStrUA86.Porana paniculata Roxb.ConvolvulaceaeFPerLStrUA87.Rbynchosia minima (L.) DC.PapilionaceaeG, W, FAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLAR90.Snilax serfoliata Lour.SmilaceaeFPerLTd91.Snilax serfoliata Lour.SmilaceaeFPerLTd92.Solena betrophylla Lour.CucurbitaceaeFPerLTd93.Spatholobus partifibrois (DC.) KuntzePapilionaceaeFPerLTd94.Stephania japonica (Thunb.) MiersMenisp	74.	Momordica charantia L.	Cucurbitaceae	G, W, F	Per	V	Td
77.Mukia maderaspatana (L.) M. Roem.CucurbitaceaeW, FAVTd78.Naravelia zcylanica (L.) DC.RanunculaceaeFPerLTd79.Operculina turpethum (L.) Silva MansoConvolvulaceaeG, W, FPerLTw80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FAVTw81.Paederia foetida L.RubiaceaeW, FALTw82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeW, FPerVTw84.Pergularia daenia (Forssk.) Chiov.AsclepiadaceaeW, FPerLTw85.Piper longum L.PiperaceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTd87.Rbynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena betrophylla Lour.CucurbitaceaeW, FAVTw93.Spatholobus partifibronis (DC.) KuntzePapilionaceaeG, WPerLTw94.Stephania japonica (Thunb.) MiersMenisperm	75.			G, W	А	V	Td
78.Naravelia zeylanica (L.) DC.RanunculaceaeFPerLTd79.Operculina turpethum (L.) Silva MansoConvolvulaceaeG, W, FPerLTw80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FAVTw81.Paederia foetida L.RubiaceaeW, FALTw82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox). Druce.AsclepiadaceaeW, FPerVTw84.Pergularia daemia (Forssk.) Chiov.AsclepiadaceaeW, FPerLTw85.Piper longum L.PiperaceaeFPerLTw86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Resa clinophylla Redout & ThoryRosaceaeFPerLAR90.Smilax zeylanica L.SmilaceaeFPerLTd91.Solindapsus officinalis (Roxb.) SchottAraceaeFPerLTd92.Solena beterophylla Lour.CucurbitaceaeW, FAVTw93.Spatholobus parvijlorus (DC.) KuntzePapilionaceaeFPerLTd94.Stepbania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.Bigno	76.	Mucuna pruriens (L.) DC.	Papilionaceae	W	А	L	Tw
79.Operculina turpethum (L.) Silva MansoConvolvulaceaeG, W, FPerLTw80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FAVTw81.Paederia foetida L.RubiaceaeW, FALTw82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox). Druce.AsclepiadaceaeWAVTw84.Pergularia daemia (Forssk.) Chiov.AsclepiadaceaeWFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Solena heterophylla Lour.CucurbitaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeFPerLTw93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) Lindl.BignoniaceaeG, WPerLStr-UA95.Tetosma palibidia (Loxb.) V. G. CraibAsclepiadeceaeW, FAVTw96.Telosma palidida (Roxb.) Peng.PapilionaceaeG, WPerLTd97.Tetosm		· · ·			А	V	Td
80.Oxystelma secamone K. Schum.AsclepiadaceaeG, W, FAVTw81.Paederia foetida L.RubiaceaeW, FALTw82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeWAVTw84.Pergularia daemia (Forssk.) Chiov.AsclepiadaceaeW, FPerVTw85.Piper longum L.PiperaceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rbynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaccaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax perfoliata Lour.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTd93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunh.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunh.) Lindl.BignoniaceaeG, WPerLStr-UA96.Telosma palidial (Roxb.) V. G. CraibAsclepiadaceaeWPerLTd97.Terastigma lanceolarium (Roxb.) Planch.Vitac		-			Per		Td
81.Paederia foetida L.RubiaceaeW, FALTw82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeWAVTw84.Pergularia daemia (Forssk.) Chiov.AsclepiadaceaeW, FPerVTw85.Piper longum L.PiperaceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLStr-A89.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR90.Smilax zeylanica L.SmilaceaeFPerLTd91.Smilax zeylanica Lour.SmilaceaeFPerLTw92.Solena heterophylla Lour.CucurbitaceaeW, FAVTw93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeG, WPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerVTw96.Telosma paliida (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Teramus labialis (L.f.) Spreng,Papilionaceae<							
82.Passiflora foetida L.PassifloraceaeW, FAVTd83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeWAVTw84.Pergularia daemia (Forssk.) Chiov.AsclepiadaceaeW, FPerVTw85.Piper longum L.PiperaceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rbrynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLAR90.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR91.Smilax zeylanica Lour.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTw93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeG, WPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerVTw96.Telosma palibialis (L.f.) Spreng,PapilionaceaeG, WPerVTw97.Teramus labialis (L.f.) Spreng,PapilionaceaeG, WPerLTd98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora		•	1				
83.Pentatropis spiralis (Fox.) Druce.AsclepiadaceaeWAVTw84.Pergularia daemia (Forsk.) Chiov.AsclepiadaceaeW, FPerVTw85.Piper longum L.PiperaceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena beterophylla Lour.CucurbitaceaeW, FAVTw93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) Lindl.BignoniaceaeG, WPerLStr-UA96.Telosma palidia (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Teramus labialis (L.f.) Spreng.PapilionaceaeG, WAVTw98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora (Roxb. ex Rortl.) Roxb.AcanthaceaeW, FPerLTd99.Thunbergia grandiflora (Roxb. ex Rortl.) Roxb.AcanthaceaeG, W, FPerLTw90. <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
84.Pergularia daemia (Forsk.) Chiov.AsclepiadaceaeW, FPerVTw85.Piper longum L.PiperaceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLStr-A89.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTw93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerLStr-UA96.Telosma pallida (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Teramnus labialis (L.f.) Spreng.PapilionaceaeFPerLTd98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora (Roxb. ex Rott.) Roxb.AcanthaceaeW, FPerLTw90.Tiliacora racemos							
85.Piper longun L.Piper caceaeFPerLStr-UA86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLStr-A89.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTd93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerVTw96.Telosma pallida (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Teramnus labialis (Lf.) Spreng.PapilionaceaeG, WAVTw98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora (Roxb. ex Rottl.) Roxb.AcanthaceaeW, FPerLTw100.Tiliacora racemosa Colebr.MenispermaceaeG,W, FPerLTw			•				
86.Porana paniculata Roxb.ConvolvulaceaeFPerLTw87.Rhynchosia minima (L.) DC.PapilionaceaeG,WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLStr-A89.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTd93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerLStr-UA96.Telosma pallida (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Tertansus labialis (L.f.) Spreng.PapilionaceaeG, WAVTw98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTw99.Thunbergia grandiflora (Roxb. ex Rottl.) Roxb.AcanthaceaeW, FPerLTw100.Tiliacora racemosa Colebr.MenispermaceaeG,W, FPerLTw							
87.Rhynchosia minima (L.) DC.PapilionaceaeG, WAVTw88.Rosa clinophylla Redout & ThoryRosaceaeFPerLStr-A89.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTd93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerLStr-UA96.Telosma pallida (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Teramnus labialis (L.f.) Spreng.PapilionaceaeG, WAVTw98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora (Roxb. ex Rortl.) Roxb.AcanthaceaeW, FPerLTw100.Tiliacora racemosa Colebr.MenispermaceaeG,W, FPerLTw			•				
88.Rosa clinophylla Redout & ThoryRosaceaeFPerLStr-A89.Scindapsus officinalis (Roxb.) SchottAraceaeFPerLAR90.Smilax perfoliata Lour.SmilaceaeFPerLTd91.Smilax zeylanica L.SmilaceaeFPerLTd92.Solena heterophylla Lour.CucurbitaceaeW, FAVTd93.Spatholobus parviflorus (DC.) KuntzePapilionaceaeFPerLTw94.Stephania japonica (Thunb.) MiersMenispermaceaeW, FAVTw95.Tecoma capensis (Thunb.) Lindl.BignoniaceaeG, WPerLStr-UA96.Telosma pallida (Roxb.) W. G. CraibAsclepiadaceaeWPerVTw97.Teramnus labialis (Lf.) Spreng.PapilionaceaeG, WAVTw98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora (Roxb. ex Rott.) Roxb.AcanthaceaeW, FPerLTw100.Tiliacora racemosa Colebr.MenispermaceaeG,W, FPerLTw		1					
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98.Tetrastigma lanceolarium (Roxb.) Planch.VitaceaeFPerLTd99.Thunbergia grandiflora (Roxb. ex Rottl.) Roxb.AcanthaceaeW, FPerLTw100.Tiliacora racemosa Colebr.MenispermaceaeG,W, FPerLTw		Telosma pallida (Roxb.) W. G. Craib		W	Per	V	Tw
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100. <i>Tiliacora racemosa</i> Colebr. Menispermaceae G,W,F Per L Tw							
101. I inospora sinensis (Lour.) Merr. Menispermaceae G, W, F Per L Tw			-				
	101.	I inospora sinensis (Lour.) Merr.	Menispermaceae	G, W, F	Per	L	Iw

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102.	Tragia involucrata L.	Euphorbiaceae	W, F	Per	V	Tw
103.	Trichosanthes cucumerina L.	Cucurbitaceae	G, W, F	А	V	Td
104.	Trichosanthes nervifolia L.	Cucurbitaceae	G, W, F	А	V	Td
105.	Tylophora indica (Burm. f.) Merr.	Asclepiadaceae	W, F	Per	L	Tw
106.	Vallaris solanacea (Roth) Kuntze	Apocynaceae	W	Per	L	Str-UA
107.	<i>Ventilago maderaspatana</i> Gaertn.	Rhamnaceae	W, F	А	L	Str-UA
108.	Vicia hirsuta (L.) Gray	Papilionaceae	G, W	А	V	Td
109.	<i>Wagatea spicata</i> Dalzell	Caesalpiniaceae	F	Per	L	Str-A
110.	Ziziphus oenoplia (L.) Mill.	Rhamnaceae	W, F	Per	L	Str-A
111.	Ziziphus xylopyrus (Retz.) Willd.	Rhamnaceae	W, F	Per	L	Str-A

Supplementary Table 2. List of tendrilar climbers based on their branching across the terrestrial landscape of north-eastern Uttar Pradesh

S. N.	Species	Family	S.N.	Species	Family
А.	Simple tendrilar climbers		B.	Branched tendrilar climbers	
1.	Coccinia grandis (L.) Voigt	Cucurbitaceae		a. Bifid	
2.	Cucumis trigonus Roxb.	Cucurbitaceae	1.	Ampelocissus latifolia (Roxb.) Planch.	Vitaceae
3.	Gloriosa superba L.	Liliaceae	2.	Bauhinia vahlii Weight & Arn.	Caesalpiniaceae
4.	Lathyrus aphaca L.	Papilionaceae	3.	Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae
5.	Lathyrus odoratus L.	Papilionaceae	4.	Cardiospermum halicacabum L.	Sapindaceae
6.	Lathyrus sativus L.	Papilionaceae	5.	Cayratia trifolia (L.) Domin	Vitaceae
7.	Momordica charantia L.	Cucurbitaceae	6.	Cissus adnata Roxb.	Vitaceae
8.	Momordica dioica Roxb. ex Willd.	Cucurbitaceae	7.	Diplocyclos palmatus (L.) C. Jeffrey	Cucurbitaceae
9.	Mukia maderaspatana (L.) M. Roem.	Cucurbitaceae	8.	Trichosanthes nervifolia L.	Cucurbitaceae
10.	Passiflora foetida L.	Passifloraceae	9.	Solena heterophylla Lour.	Cucurbitaceae
11.	Smilax perfoliata Lour.	Smilaceae		b.Trifid	
12.	Smilax zeylanica L.	Smilaceae	1.	Antigonon leptopus Hook. &Arn.	Polygonaceae
13.	Tetrastigma lanceolarium (Roxb.) Planch.	Vitaceae	2.	Naravelia zeylanica (L.) DC.	Ranunculaceae
14.	Vicia hirsuta (L.) Gray	Papilionaceae	3.	Trichosanthes cucumerina L.	Cucurbitaceae

SupplementaryTtable 3. List of climbing plant species showing right-handed and left-handed twining pattern across the terrestrial vegetation of north-eastern Uttar Pradesh

S. N	Species	Family	S.N.	Species	Family				
A.	Right-handed Twining plants								
1.	Abrus precatorius L.	Papilionaceae	27.	<i>Ipomoea maxima</i> (L. f.) Don ex Sw.	Convolvulaceae				
2.	Aganosma caryophyllata (Roxb.) G. Don	Apocynaceae	28.	<i>Ipomoea muricata</i> (L.) Jacq.	Convolvulaceae				
3.	Aristolochia indica L.	Aristolochiaceae	29.	Ipomoea nil (L.) Roth	Convolvulaceae				
4.	Asparagus racemosus Willd.	Liliaceae	30.	Ipomoea obscura (L.) Ker Gawl.	Convolvulaceae				
5.	Basella alba L.	Basellaceae	31.	Ipomoea pes-tigridis L.	Convolvulaceae				
6.	<i>Cajanus scarabaeoides</i> (L.) Thouars	Papilionaceae	32.	Ipomoea purpurea (L.) Roth	Convolvulaceae				
7.	Celastrus paniculatus Willd.	Celastraceae	33.	Ipomoea quamoclit L.	Convolvulaceae				
8.	Cissampelos pareira L.	Menispermaceae	34.	Merremia hederacea (Burm. f.) Hallier f.	Convolvulaceae				
9.	Clematis gouriana Roxb. ex DC.	Ranunculaceae	35.	Mucuna pruriens (L.) DC	Papilionaceae				
10.	Clerodendrum splendens G.Don	Verbenaceae	36.	Operculina turpethum (L.) Silva Manso	Convolvulaceae				
11.	Clitoria ternatea L.	Papilionaceae	37.	Oxystelma secamone K. Schum.	Asclepiadaceae				
12.	Cocculus hirsutus (L.) W. Theob.	Menispermaceae	38.	Paederia foetida L.	Rubiaceae				
13.	Cocculus trilobus (Thunb.) DC.	Menispermaceae	39.	Pentatropis spiralis (Fox.) Druce.	Asclepiadaceae				
14.	Convolvulus arvensis L.	Convolvulaceae	40.	Pergularia daemia (Forssk.) Chiov.	Asclepiadaceae				
15.	Cuscuta chinensis Lam.	Cuscutaceae	41.	Porana paniculata Roxb.	Convolvulaceae				
16.	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	42.	Rhynchosia minima (L.) DC.	Papilionaceae				
17.	Derris scandens (Roxb.) Benth.	Papilionaceae	43.	Spatholobus parviflorus (DC.) Kuntze	Papilionaceae				
18.	Dioscorea deltoidea Wall. Ex Griseb.	Dioscoreaceae	44.	Stephania japonica (Thunb.) Miers	Menispermaceae				
19.	<i>Dioscorea japonica</i> Thunb.	Dioscoreaceae	45.	Telosma pallida (Roxb.) W. G. Craib	Asclepiadaceae				
20.	Erycibe paniculata F.M. Bailey	Convolvulaceae	46.	Teramnus labialis (L.f.) Spreng.	Papilionaceae				
21.	Hemidesmus indicus (L.) R. Br. ex Schult.	Asclepiadaceae	47.	<i>Thunbergia grandiflora</i> (Roxb. ex Rottl.) Roxb.	Acanthaceae				
22.	Ichnocarpus frutescens (L.) W.T. Aiton	Apocynaceae	48.	<i>Tiliacora racemosa</i> Colebr.	Menispermaceae				

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23. 24.	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae Convolvulaceae	49. 50	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae			
	Ipomoea eriocarpa R. Br.		50.	Tragia involucrata L.	Euphorbiaceae			
25.	Ipomoea hederifolia L.	Convolvulaceae	51.	<i>Tylophora indica</i> (Burm. f.) Merr.	Asclepiadaceae			
26.	Dioscorea oppositifolia L.	Dioscoreaceae						
B.	Left-handed Twining Plants							
1.	Dioscorea bulbifera L.	Dioscoreaceae						
2.	Dioscorea echinata R. Knuth	h Dioscoreaceae						
3.	Dioscorea pentaphylla L.	ylla L. Dioscoreaceae						
4.	Merremia dissecta (Jacq.) Hallier f.	Convolvulaceae						
5.	<i>Mikania micrantha</i> Kunth	Asteraceae						