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SHORT COMMUNICATION

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Glimpse of climber diversity in Saharanpur District, Uttar Pradesh, India

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Abstract: The present paper focuses on the herbaceous and woody climbers of Saharanpur District. A total of 66 species of herbaceous climbers, 33 species of woody climbers, 15 species of climbing shrubs, and two species of parasitic climbers belonging 27 different families have been recorded. Climbers belonging to the families such as Convolvulaceae, Cucurbitaceae, Fabaceae, and Apocynaceae were found to be dominant in this region. This study also records the occurrence of 14 species of threatened climbers.

Keywords: Apocynaceae, Convolvulaceae, Cucurbitaceae, Fabaceae, threatened.

A climber starts its life on the forest floor and spends almost one-fourth of its life on forest surface. After this phase the adhering, anchoring, and leaning starts on other plants to achieve immense stature (Jongkind & Hawthorne 2005). Families such as Cucurbitaceae, Convolvulaceae, and Dioscoreaceae are considered to be climber rich. Amongst the climber-rich families, Apocynaceae, Rubiaceae, Celastraceae, and Leguminosae have more than 50 species (Gentry 1991; Schnitzer & Bongers 2002). Diversity is also found in the climbing mechanism in the form of branch twiners, stem twiners, tendril climbers, root adhesive climbers, hook climbers, and scramblers (Bongers et al. 2005; Jongking & Hawthorne 2005). Climbers are rooted plants in the ground but necessitate hold up for their growth and

these may be root climbers, scramblers, tendril climbers, and twiners. Climbers mostly occur in woody plant ecosystem, although diversity is found in subtropical and tropical forests (Richards 1952; Schimper 1903; Bongers et al. 2005). Tropical rain forest has a high diversity of climbers up to 30% of vegetation (Schnitzer & Bongers 2002). Climbing plant species are more abundantly associated to tropical forest than temperate forest (Putz 1984; Richard 1996).

Climber is defined as plant species that require mechanical support for its growth (Putz & Windsor 1987). It includes herbaceous and woody lianas (Gentry 1991). According to an estimate, climbers are one half of vascular plant species. Hippocrataceae, Vitaceae, and Smilacaceae families have lianas or vines (Putz 1984; Gentry 1991). A climber floristically plays an important role in tropical forest and considered to be a structural component that affects the physiognomy of the forest (Gentry 1991). A climber plant species plays a vital role in forest ecosystem as it provides habitat and food for animals (Hladik 1978; Emmons & Gentry 1983; Gentry 1991; Gelatti & Padroni 1994). Climbers are almost neglected in all floristic studies but this group represents one of the major part of plant collections (Gentry 1991). A review of the literature reveals that several workers did comprehensive work on climbers

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Figure 1. Study area

and related taxa (DeWalt et al. 2000; Muthuramkumar & Parthasarathy 2001; Pérez-Salicrup et al. 2001; Reddy & Parthasarathy 2003; Kouamé et al. 2004; Parthasarathy et al. 2004; DeWalt et al. 2006; Mukherjee 2006; Prasad et al. 2009; Ghosh & Pandey 2014). During the present study, an attempt was made to enumerate and list all native, exotic, and threatened climbers of Saharanpur forest division of Uttar Pradesh, India. During fields surveys and floristic study, the authors collected many plant species and recorded 116 climbers (Table 1).

MATERIAL AND METHODS

Saharanpur lies between 29°34'45"–30°21'30"N & 77°9'46"–78°14'45"E with the average 269m elevation and covers 3,689km² area. Most part of the Saharanpur District is plain except the northern frontier which includes Shivalik Hills. While inventorying the flora of Saharanpur, the authors conducted several field trips in different seasons and collected hundreds of plant species. During the field survey many climber specimens were collected, processed, preserved, and mounted on herbarium sheets following the standard herbarium techniques (Jain & Rao 1977). The dried and fresh specimens were identified using floras published by Hooker (1872–1897), Duthie (1903–1929), Brandis

(1906), Kanjilal (1928), Maheshwari (1963), and Delta software. The herbarium sheets are preserved in the Department of Botany, C.C.S. University, and Meerut.

RESULT AND DISCUSSION

During field surveys, the authors collected many plant and recorded 116 species (98 native and 18 non-native) of climbers, of which 66 were herbaceous climbers, 33 woody climbers or lianas and 15 climbing shrubs, and two parasite climbers (Images 1–22). We also observed diversity in the nature of climbing organs. It was reported that out of 116 climber species 70 are twiners, 24 are tendrill climbers, 15 are climbing shrubs, four are root climbers and three are hook climbers.

Threatened climbers of Saharanpur District

Abrus precatorius, *Aspidopterys cordata*, *Asparagus racemosus*, *Cryptostegia grandiflora*, *Brachypterum scandens*, *Dioscorea alata*, *D. bulbifera*, *Ipomoea dichroa*, *Mucuna pruriens*, *Operculina terpethum*, *Paederia foetida*, *Pueraria tuberosa*, *Trichosanthes cucumerina*, and *Vincetoxicum indicum* are some of the threatened climbers found in Saharanpur District. These findings are in accordance to the work done by previous explorers (Malik 2016; Barik et al. 2018).

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Table 1. Enumeration of different climbing plant of district Saharanpur.

	Binomial	Family	Climber type	Climbing mode	Nature of climbing organ
1	<i>Abrus melanospermus</i> Hassk.	Leguminosae-Papilionoideae	Herbaceous climber	Twiner	Stem
2	<i>Abrus precatorius</i> L.	Leguminosae-Papilionoideae	Herbaceous climber	Twiner	Stem
3	<i>Allamanda cathartica</i> L.	Apocynaceae	Herbaceous climber	Twiner	Stem
4	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Vitaceae	Woody climber	Tendrill climber	Stem
5	<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Herbaceous climber	Tendrill climber	Inflorescence axis
6	<i>Argyreia nervosa</i> (Burm.f.) Bojer	Convolvulaceae	Herbaceous climber	Twiner	Stem
7	<i>Aristolochia littoralis</i> Parodi	Aristolochiaceae	Herbaceous climber	Tendrill climber	Modified axillary bud
8	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Herbaceous climber	Twiner	Stem
9	<i>Asparagus setaceus</i> (Kunth) Jessop	Asparagaceae	Herbaceous climber	Twiner	Stem
10	<i>Aspidopterys cordata</i> (B. Heyne ex Wall.) A.Juss.	Malpighiaceae	Climbing shrub	Climbing shrub	Stem
11	<i>Aspidopterys wallichii</i> Hook.f.	Malpighiaceae	Climbing shrub	Climbing shrub	Stem
12	<i>Basella alba</i> L.	Basellaceae	Herbaceous climber	Twiner	Stem
13	<i>Bougainvillea spectabilis</i> Willd.	Nyctaginaceae	Woody climber	Hook climber	Stem
14	<i>Brachypterum scandens</i> (Roxb.) Miq.	Leguminosae-Papilionoideae	Climbing shrub	Twiner	Stem
15	<i>Cajanus crassus</i> (Prain ex King) Maesen	Fabaceae	Climbing shrub	Climbing shrub	Stem
16	<i>Cajanus scarabaeoides</i> (L.) Thouars	Leguminosae-Papilionoideae	Herbaceous climber	Twiner	Stem
17	<i>Campsis radicans</i> (L.) Bureau	Bignoniaceae	Woody climber	Twiner	Stem
18	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Herbaceous climber	Tendrill climber	Inflorescence axis
19	<i>Causonis trifolia</i> (L.) Mabb. & J.Wen	Vitaceae	Herbaceous Climber	Tendrill climber	Stem
20	<i>Celastrus orbiculatus</i> Thunb.	Celastraceae	Woody climber	Twiner	Stem
21	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Woody climber	Twiner	Stem
22	<i>Cissampelos pareira</i> L.	Menispermaceae	Herbaceous climber	Twiner	Modified auxiliary bud
23	<i>Cissus repanda</i> (Wight & Arn.) Vahl	Vitaceae	Woody climber	Twiner	Stem
24	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Cucurbitaceae	Herbaceous climber	Twiner	Stem
25	<i>Clerodendrum splendens</i> G.Don	Lamiaceae	Woody climber	Twiner	Stem
26	<i>Clerodendrum thomsoniae</i> Balf.f.	Lamiaceae	Woody climber	Twiner	Stem
27	<i>Clitoria ternatea</i> L.	Leguminosae-Papilionoideae	Herbaceous climber	Twiner	Stem
28	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified axillary bud
29	<i>Cocculus hirsutus</i> (L.) W.Theob.	Menispermaceae	Herbaceous climber	Twiner	Stem
30	<i>Combretum indicum</i> (L.) DeFilipps	Combretaceae	Woody climber	Twiner	Stem
31	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Herbaceous climber	Twiner	Stem
32	<i>Cryptolepis buchananii</i> R.Br. ex Roem. & Schult.	Apocynaceae	Climbing shrub	Climbing shrub	Stem
33	<i>Cryptostegia grandiflora</i> Roxb. ex R.Br.	Apocynaceae	Woody climber	Twiner	Stem
34	<i>Cucumis maderaspatanus</i> L.	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified auxiliary bud
35	<i>Cucumis melo</i> L.	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified auxiliary bud
36	<i>Cucumis sativus</i> L.	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified axillary bud
37	<i>Cucurbita maxima</i> Duchesne	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified axillary bud
38	<i>Cuscuta campestris</i> Yunck.	Convolvulaceae	Parasite climber	Twiner	Stem
39	<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Parasite climber	Twiner	Stem
40	<i>Dioscorea alata</i> L.	Dioscoreaceae	Herbaceous climber	Twiner	Stem



	Binomial	Family	Climber type	Climbing mode	Nature of climbing organ
41	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Herbaceous climber	Twiner	Stem
42	<i>Diplocyclos palmatus</i> (L.) C.Jeffrey	Cucurbitaceae	Herbaceous climber	Tendrill climber	Leader axis of main stem
43	<i>Distimake aegyptius</i> (L.) A.R.Simões & Staples	Convolvulaceae	Herbaceous climber	Twiner	Modified auxiliary bud
44	<i>Distimake dissectus</i> (Jacq.) A.R.Simões & Staples	Convolvulaceae	Herbaceous climber	Twiner	Modified auxiliary bud
45	<i>Dolichandra unguis-cati</i> (L.) L.G.Lohmann	Bignoniaceae	Woody climber	Tendrill climber	Stem
46	<i>Epipremnum aureum</i> (Linden & André) G.S.Bunting	Araceae	Herbaceous climber	Root climber	Arial adventitious root
47	<i>Epipremnum pinnatum</i> (L.) Engl.	Araceae	Herbaceous climber	Root climber	Arial adventitious root
48	<i>Ficus pumila</i> L.	Moraceae	Woody climber	Root climber	Root
49	<i>Guilandina bonduc</i> L.	Leguminosae-Caesalpinioideae	Woody climber	Hook climber	Prickles on stem & leaf rachis
50	<i>Helinus lanceolatus</i> Brandis	Rhamnaceae	Climbing shrub	Climbing shrub	Stem
51	<i>Hiptage benghalensis</i> (L.) Kurz	Malpighiaceae	Woody climber	Twiner	Stem
52	<i>Holmskioldia sanguinea</i> Retz.	Lamiaceae	Climbing shrub	Climbing shrub	Stem
53	<i>Ichnocarpus frutescens</i> (L.) W.T. Aiton	Apocynaceae	Woody climber	Twiner	Stem
54	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	Herbaceous climber	Twiner	Stem
55	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae	Herbaceous climber	Twiner	Stem
56	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	Herbaceous climber	Twiner	Stem
57	<i>Ipomoea cheirophylla</i> O' Donell	Convolvulaceae	Herbaceous climber	Twiner	Stem
58	<i>Ipomoea dichroa</i> Hochst. ex Choisy	Convolvulaceae	Herbaceous climber	Twiner	Stem
59	<i>Ipomoea hederifolia</i> L.	Convolvulaceae	Herbaceous climber	Twiner	Stem
60	<i>Ipomoea muricata</i> (L.) Jacq.	Convolvulaceae	Herbaceous climber	Twiner	Stem
61	<i>Ipomoea nil</i> (L.) Roth	Convolvulaceae	Herbaceous climber	Twiner	Stem
62	<i>Ipomoea obscura</i> (L.) Ker Gawl.	Convolvulaceae	Herbaceous climber	Twiner	Stem
63	<i>Ipomoea pes-caprae</i> (L.) R.Br.	Convolvulaceae	Herbaceous climber	Twiner	Stem
64	<i>Ipomoea quamoclit</i> L.	Convolvulaceae	Herbaceous climber	Twiner	Stem
65	<i>Ipomoea triloba</i> L.	Convolvulaceae	Herbaceous climber	Twiner	Stem
66	<i>Jasminum laurifolium</i> Roxb. ex Hornem.	Oleaceae	Woody Climber	Twiner	Stem
67	<i>Jasminum multiflorum</i> (Burm.f.) Andrews	Oleaceae	Woody Climber	Twiner	Stem
68	<i>Lablab purpureus</i> (L.) Sweet	Fabaceae	Herbaceous climber	Twiner	Modified stem
69	<i>Lagenaria siceraria</i> (Molina) Standl.	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified auxiliary bud
70	<i>Leptadenia reticulata</i> (Retz.) Wight & Arn.	Apocynaceae	Woody Climber	Twiner	Stem
71	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified auxiliary bud
72	<i>Mansoa alliacea</i> (Lam.) A.H.Gentry	Bignoniaceae	Woody Climber	Twiner	Modified auxiliary bud
73	<i>Merremia hederacea</i> (Burm.f.) Hallier f.	Convolvulaceae	Herbaceous climber	Twiner	Modified auxiliary bud
74	<i>Millettia extensa</i> (Benth.) Benth. ex Baker	Leguminosae-Papilionoideae	Woody climber	Twiner	Stem
75	<i>Mimosa pudica</i> L.	Leguminosae-Mimosoideae	Herbaceous climber	Twiner	Prickles on stem
76	<i>Momordica charantia</i> L.	Cucurbitaceae	Herbaceous climber	Tendrill climber	Modified auxiliary bud
77	<i>Monstera deliciosa</i> Liebm.	Araceae	Herbaceous climber	Root climber	Arial adventitious root
78	<i>Mucuna hainanensis</i> Hayata	Leguminosae-Papilionoideae	Woody climber	Twiner	Stem
79	<i>Mucuna imbricata</i> (Roxb. ex Lindl.) D C. ex Baker	Leguminosae-Papilionoideae	Woody climber	Twiner	Stem

	Binomial	Family	Climber type	Climbing mode	Nature of climbing organ
80	<i>Mucuna monosperma</i> Roxb. ex Wight	Leguminosae-Papilionoideae	Woody climber	Twiner	Stem
81	<i>Mucuna pruriens</i> (L.) DC.	Leguminosae-Papilionoideae	Woody climber	Twiner	Modified stem
82	<i>Operculina turpethum</i> (L.) Silva Manso	Convolvulaceae	Herbaceous climber	Twiner	Modified axillary bud
83	<i>Oxystelma esculentum</i> (L.f.) Sm.	Apocynaceae	Herbaceous Climber	Twiner	Stem
84	<i>Paederia foetida</i> L.	Rubiaceae	Herbaceous Climber	Twiner	Leader axis of branch
85	<i>Passiflora foetida</i> L.	Passifloraceae	Herbaceous climber	Tendrill climber	Modified axillary bud
86	<i>Passiflora suberosa</i> L.	Passifloraceae	Herbaceous climber	Tendrill climber	Modified axillary bud
87	<i>Passiflora vitifolia</i> Kunth	Passifloraceae	Herbaceous climber	Tendrill climber	Modified axillary bud
88	<i>Pentalinon luteum</i> (L.) B.F. Hansen & Wunderlin	Apocynaceae	Climbing shrub	Climbing shrub	Stem
89	<i>Petrea volubilis</i> L.	Verbenaceae	Woody climber	Twiner	Stem
90	<i>Phanera vahlii</i> (Wight & Arn.) Benth.	Leguminosae-Caesalpinioideae	Woody climber	Twiner	Stem
91	<i>Poranopsis paniculata</i> (Roxb.) Roberty	Convolvulaceae	Woody Climber	Twiner	Stem
92	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.	Leguminosae-Papilionoideae	Woody Climber	Twiner	Stem
93	<i>Pyrostegia venusta</i> (Ker Gawl.) Miers	Bignoniaceae	Herbaceous Climber	Tendrill climber	Stem
94	<i>Rivea hypocrateriformis</i> (Desr.) Choisy	Convolvulaceae	Climbing shrub	Climbing shrub	Stem
95	<i>Senegalia gageana</i> (Craib) Maslin, Seigler & Ebinger	Leguminosae-Mimosoideae	Climbing shrub	Climbing shrub	Stem
96	<i>Senegalia pennata</i> (L.) Maslin	Leguminosae-Mimosoideae	Climbing shrub	Climbing shrub	Stem
97	<i>Senegalia torta</i> (Roxb.) Maslin, Seigler & Ebinger	Leguminosae-Mimosoideae	Climbing shrub	Climbing shrub	Stem
98	<i>Spatholobus parviflorus</i> (Roxb. ex G. Don) Kuntze	Leguminosae-Papilionoideae	Woody Climber	Twiner	Stem
99	<i>Stephanotis floribunda</i> Jacques	Apocynaceae	Woody Climber	Twiner	Stem
100	<i>Syngonium podophyllum</i> Schott	Araceae	Herbaceous Climber	Root climber	Aerial adventitious root
101	<i>Tarimounia elliptica</i> (DC.) H. Rob, S.C. Keeley, Skvarla & R. Chan	Asteraceae	Herbaceous Climber	Twiner	Stem
102	<i>Telosma pallida</i> (Roxb.) W.G. Craib	Apocynaceae	Woody Climber	Twiner	Stem
103	<i>Teramnus labialis</i> (L.f.) Spreng.	Leguminosae-Papilionoideae	Herbaceous Climber	Tendrill climber	Stem
104	<i>Thunbergia coccinea</i> Wall. ex D. Don	Acanthaceae	Herbaceous Climber	Twiner	Stem
105	<i>Tiliacora racemosa</i> Colebr.	Menispermaceae	Climbing shrub	Climbing shrub	Stem
106	<i>Tinospora cordifolia</i> (Willd.) Hook. f. & Thomson	Menispermaceae	Woody Climber	Twiner	Stem
107	<i>Trachelospermum jasminoides</i> (Lindl.) Lem.	Apocynaceae	Woody Climber	Twiner	Stem
108	<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae	Herbaceous Climber	Tendrill climber	Leaf auxiliary bud
109	<i>Trichosanthes dioica</i> Roxb.	Cucurbitaceae	Herbaceous Climber	Tendrill climber	Leaf auxiliary bud
110	<i>Vallis solanacea</i> (Roth) Kuntze	Apocynaceae	Climbing shrub	Climbing shrub	Stem
111	<i>Vigna unguiculata</i> (L.) Walp.	Leguminosae-Papilionoideae	Herbaceous climber	Twiner	Stem
112	<i>Vincetoxicum indicum</i> (Burm.f.) Mabb.	Apocynaceae	Herbaceous Climber	Twiner	Stem
113	<i>Vitis vinifera</i> L.	Vitaceae	Woody climber	Tendrill climber	Stem
114	<i>Wattakaka volubilis</i> (L.f.) Stapf	Apocynaceae	Woody climber	Twiner	Stem
115	<i>Wisteria sinensis</i> (Sims) DC.	Fabaceae	Woody climber	Twiner	Stem
116	<i>Ziziphus oenoplia</i> (L.) Mill.	Rhamnaceae	Woody climber	Hook climber	Stem and thorns



Image 1. *Basella alba*



Image 2. *Diplocyclos palmatus*



Image 3. *Oxystelma esculenta*



Image 4. *Holmskioldia sanguinea*



Image 5. *Clitoria ternatea*

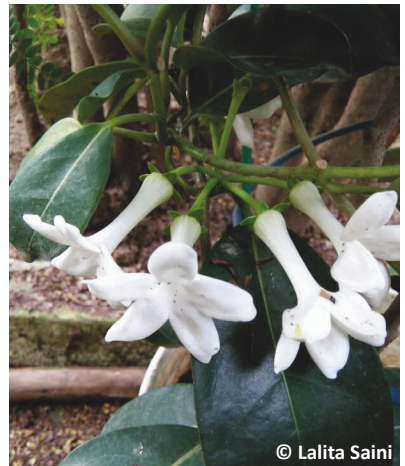


Image 6. *Stephanotis floribunda*



Image 7. *Pueraria tuberosa*



Image 8. *Wattakaka volubilis* (L.f.) Stapf

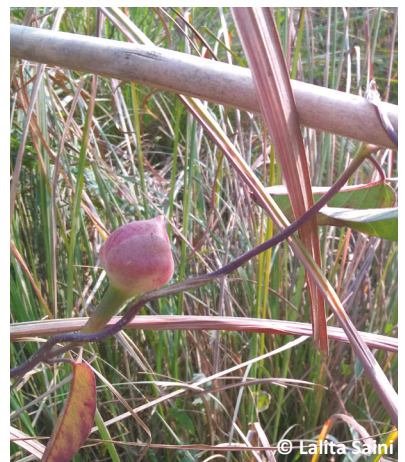


Image 9. *Operculina turpethum*



Image 10. *Convolvulus arvensis*



Image 11. *Vallis solanacea*



Image 12. *Ichnocarpus frutescens*



Image 13. *Paederia foetida*



Image 14. *Cajanus scarabaeoides*



Image 15. *Abrus pulchellus*



Image 16. *Poranopsis paniculata*

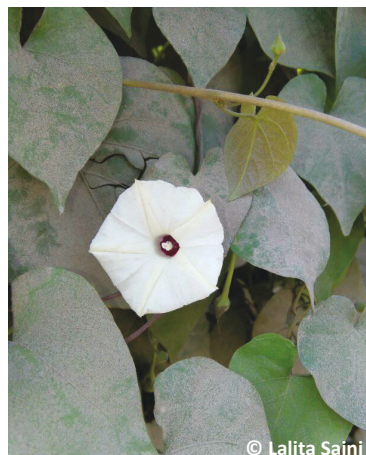


Image 17. *Ipomoea obscura*



Image 18. *Telosma pallida*

Image 19. *Cissus repanda*Image 20. *Clerodendrum thomsoniae*Image 21. *Aspidopterys cordata*Image 22. *Cardiospermum halicacabum*

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