



ISSN (E): 2320-3862
ISSN (P): 2394-0530
www.plantsjournal.com
JMPS 2022; 10(3): 36-41
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Received: 03-03-2022
Accepted: 18-04-2022

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Assessment of plant bio-diversity Munjaba hills a link between plains and Northern Western Ghats

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Abstract

Western Ghats is one of the mega biodiversity center in the world and second in India. Junnar tehsil region is an important link between the Deccan plains on east side and Western Ghats and Konkan region on the west, since 'Satvahana dynasty'. The Munjaba hills is between this link. Munjaba hills altitude from sea level is 1100m. These linked area have great biodiversity and support many important plants and animals. One of the hill in this link has been studied for consecutive two years 2009 to 2011 for diversity of floristic composition having some important and unique species reported from Maharashtra state. In the study five random quadrates were laid down and 50 species were assessed for distribution in the area studied. A distribution map for these species is also reported. Total 213 plant species, 208 are flowering plant species, 5 are pteridophytes plant species and 24 endemic taxa were recorded during the study and the floristic analysis is done. This is the only location (19.268809, 74.024213) for *Tillaea schimperii* (C. A. Mey.) M. G. Gilbert, H. Ohba & K. T. Fu in Maharashtra and central India, elevation is 955 to 1100 meter from sea level. These species mainly found in cold desert of rock crevices and sometimes epiphytic habitat. There favorable temperature in cold desert 6 °C to 25 °C to growth of *Tillaea schimperii* plant. In Maharashtra the temperature range from 15 °C to 40 °C this temperature is not favorable for these plant, but still this plant get adapted to adverse temperature.

Keywords: Plant bio-diversity, Western Ghats, mega biodiversity center, Deccan plains

Introduction

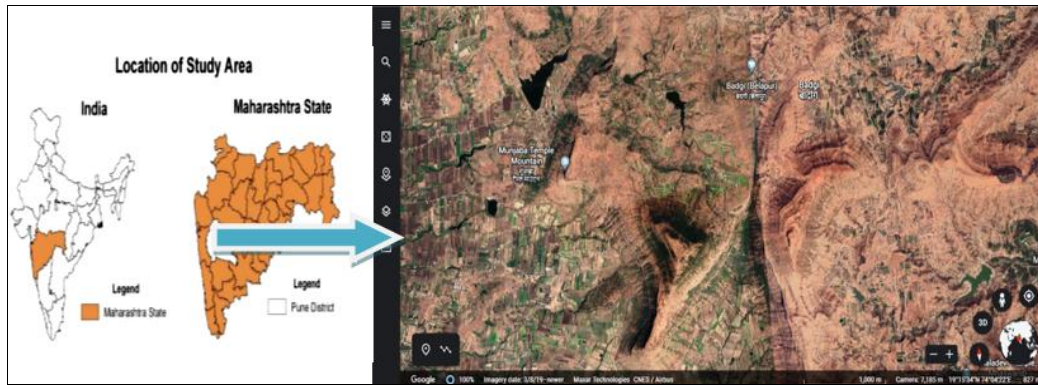
Western Ghats is one of the mega biodiversity center in the world and second in India the Western Ghats are divided into three sub-regions, there are Northern Western Ghats ('Sahyadri range'), Central Western Ghats, and Southern Western Ghats. (Myers *et al.*, 2000) [3]. Knowing and making scientific record of our nature wealth is one of the primary objective (objective 4.7) under the Biodiversity action plan of Government of India (MEFCC, 2008) [2]. Flora of Western Ghats are quite rich and its carry more than 62.8% are endemic and medicinally significant. Due to its unique biodiversity, it is one of the important areas with very high value of endemism. This is very necessary to utilize our locally available natural resources which is ultimate result come into enhancement of national economy if turned to commercial level through bio-prospecting way. It require a detailed inventorization of biological wealth available in each nook and corner of an area. As we are located in one of the mega bio-diversity center, i.e the Western Ghats and special the region is Northern Western Ghats, it is our duty to know it thoroughly (Rao, 2002) [6].

The Munjaba hill are situated between the high hills of Northern Western Ghats and Deccan plains of Maharashtra on the east side, hereby linking both the areas. It was assumed that, this link may have important floristic elements which show the corridor for dissemination of the species across the state. In this respect a study was undertaken to assess the biodiversity of the hills near Otur city as a co-curricular activity. This is the only location (19.268809, 74.024213) for *Tillaea schimperii* (C. A. Mey.) M. G. Gilbert, H. Ohba & K. T. Fu in Maharashtra and central India, elevation is 955 meter from sea level. These species mainly found in cold desert of rock crevices and sometimes epiphytic habitat. There favorable temperature in cold desert 6 °C to 25 °C to growth of *Tillaea schimperii* plant. In Maharashtra the temperature range from 15 °C to 40 °C this temperature is not favorable for these plant, but still this plant get adapted to adverse temperature (Fig. 03) (Gilbert *et al.*, 2000; Rahangdale *et al.*, 2010) [1, 4].

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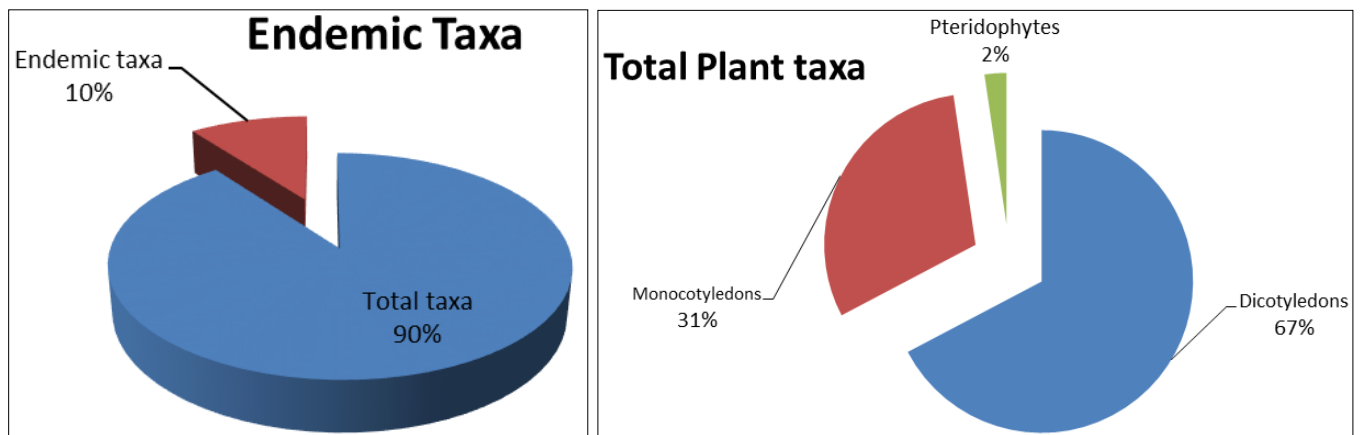
Study area Munjaba hills from Junnar Tehsil

Methodology

Repeated survey of the area under study using GPS (1.5 sq. km.) Collection of sample and preparation of herbarium specimens. The specimens were identified with the help of floras and other available literature (Singh *et al.*, 2000; Singh *et al.*, 2001; Rahangdale & Rahangdale, 2014) [7, 8, 5]. Ecological Quadrature study as per Michel.

Total 213 plant species are observed from the study area. Angiosperms 208 and 5 pteridophytes. The angiosperm taxa belong to 208 species of 58 families. Total endemic taxa are observed 24 species. Total 143 species of 44 families belong to dicotyledons, while 65 species of 44 families to the monocotyledons. The Poaceae is the largest family in the study area represented by 34 species. 26 and 20 species followed by Fabaceae and Asteraceae respectively.

Result



Observation Table 1: Plant list

Sr. No.	Family	Botanical Name	Habit	Endemism
1.	Acanthaceae	<i>Lepidagathis cuspidata</i> Nees	H	
2.	Acanthaceae	<i>Justicia procumbens</i> L.	H	
3.	Acanthaceae	<i>Justicia quadrifaria</i> (Nees) T. Anderson	H	
4.	Acanthaceae	<i>Barleria prionitis</i> L.	H	
5.	Amaranthaceae	<i>Aerva lanata</i> (L.) Schult.	H	
6.	Amaranthaceae	<i>Celosia argentea</i> L.	H	
7.	Amaranthaceae	<i>Pupalia lappacea</i> (L.) Juss.	H	
8.	Amaranthaceae	<i>Achyranthes aspera</i> L.	H	
9.	Amaryllidaceae	<i>Pancratium parvum</i> Dalzell	H	
10.	Anacardiaceae	<i>Mangifera indica</i> L.	T	
11.	Anacardiaceae	<i>Lannea coromandelica</i> (Houtt.) Merr.	T	
12.	Apiaceae	<i>Trachyspermum roxburghianum</i> (DC.) Craib.	H	
13.	Apiaceae	<i>Pimpinella adscendens</i> Dalz.	H	
14.	Apiaceae	<i>Pimpinella wallichiana</i> (Miq. ex Hohen.) Gandhi	H	
15.	Apiaceae	<i>Pinda concanensis</i> (Dalz.) P. K. Mukh. & Constance	H	+
16.	Apiaceae	<i>Heracleum aquilegifolium</i> C.B.Cl.	H	
17.	Apocynaceae	<i>Catharanthus pusillus</i> (Murr.) G. Don	H	
18.	Apocynaceae	<i>Carissa congesta</i> Wight	S	
19.	Apocynaceae	<i>Ceropegia bulbosa</i> Roxb.	C	
20.	Apocynaceae	<i>Wattakaka volubilis</i> (L. fil.) Stapf.	C	
21.	Apocynaceae	<i>Hemidesmus indicus</i> (L.) R.Br.	C	+
22.	Apocynaceae	<i>Tylophora indica</i> (Burm. f.) Merrill	C	
23.	Apocynaceae	<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex G. Don	S	
24.	Apocynaceae	<i>Calotropis gigantea</i> (L.) Dryand.	S	
25.	Araceae	<i>Arisaema murrayi</i> (J. Graham) Hook	H	+

26.	Araceae	<i>Arisaema tortuosum</i> (Wall.) Schott	H	
27.	Asclepiadaceae	<i>Frerea indica</i> Dalz.	H	+
28.	Asparagaceae	<i>Dipcadi ursulae</i> Blatt.	H	
29.	Asparagaceae	<i>Asparagus racemosus</i> Willd.	C	
30.	Asparagaceae	<i>Asparagus africanus</i> Lam.	C	
31.	Asparagaceae	<i>Agave americana</i> L.	S	
32.	Asparagaceae	<i>Chlorophytum laxum</i> R.Br.	H	
33.	Asparagaceae	<i>Scilla hyacinthina</i> (Roth) J.F.Macbr.	H	
34.	Asparagaceae	<i>Chlorophytum indicum</i> (Willd. ex Schult. & Schult.f.) Dress	H	
35.	Asparagaceae	<i>Drimia razii</i> Ansari	H	+
36.	Asteraceae	<i>Lactuca intybacea</i> Jacq.	H	
37.	Asteraceae	<i>Elephantopus scaber</i> Auct. non L.	H	
38.	Asteraceae	<i>Glossocardia bosvallia</i> (L.f.) DC.	H	
39.	Asteraceae	<i>Tridax procumbens</i> L.	H	
40.	Asteraceae	<i>Notonia grandiflora</i> Wall. ex DC.	S	
41.	Asteraceae	<i>Ageratum conyzoides</i> L.	H	
42.	Asteraceae	<i>Blumea malcolmii</i> Hook.f.	H	
43.	Asteraceae	<i>Parthenium hysterophorus</i> L.	H	
44.	Asteraceae	<i>Cyathocline purpurea</i> (Buch.-Ham. ex D. Don) Kuntze	H	+
45.	Asteraceae	<i>Tricholepis radicans</i> (Roxb.) DC.	H	+
46.	Asteraceae	<i>Caesulia axillaris</i> Roxb.	H	
47.	Asteraceae	<i>Pulicaria wightiana</i> (DC.) C.B.Clarke	H	
48.	Asteraceae	<i>Senecio bombayensis</i> Balakr	H	+
49.	Asteraceae	<i>Cyathocline purpurea</i> Kuntze	H	
50.	Asteraceae	<i>Cosmos bipinnatus</i> cav	H	
51.	Asteraceae	<i>Senecio bombayensis</i> N.P.Balakr.	H	
52.	Asteraceae	<i>Xanthium indicum</i> Koen.	H	
53.	Asteraceae	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	S	
54.	Asteraceae	<i>Zinnia elegans</i> Jacq.	H	
55.	Asteraceae	<i>Lagascea mollis</i> Cav.	H	
56.	Balsaminaceae	<i>Impatiens balsamina</i> L.		
57.	Balsaminaceae	<i>Impatiens minor</i> (DC.) Bennet		
58.	Balsaminaceae	<i>Impatiens lawii</i> Hook.f. & Thomson	H	
59.	Balsaminaceae	<i>Impatiens balsamina</i> L.	H	
60.	Begoniaceae	<i>Begonia crenata</i> Dryand.	H	
61.	Boraginaceae	<i>Cordia dichotoma</i> G.Forst	T	
62.	Boraginaceae	<i>Heliotropium indicum</i> L.	H	
63.	Cactaceae	<i>Opuntia elatior</i> Mill.	S	
64.	Capparaceae	<i>Capparis rotundifolia</i> Rottler	S	
65.	Celastraceae	<i>Celastrus paniculatus</i> Wild.	C	
66.	Celastraceae	<i>Maytenus rothiana</i> (Walp.) Ramamoorthy	S	
67.	Cleomaceae	<i>Cleome monophylla</i> L.	H	
68.	Cleomaceae	<i>Cleome simplicifolia</i> (Cambess) Hook. f. & Thomson	H	
69.	Colchicaceae	<i>Gloriosa superba</i> L.	C	+
70.	Colchicaceae	<i>Iphigenia stellata</i> Blatt.	H	+
71.	Colchicaceae	<i>Iphigenia indica</i> (L.) A.Gray ex Kunth	H	+
72.	Combretaceae	<i>Terminalia tomentosa</i> (Roxb.) Wight & Arn.	T	
73.	Combretaceae	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	T	
74.	Commelinaceae	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	H	
75.	Commelinaceae	<i>Cyanotis fasciculata</i> (B.Heyne ex Roth) Schult. & Schult.	H	
76.	Commelinaceae	<i>Cyanotis tuberosa</i> (Roxb.) Schult. & Schult.f.	H	
77.	Commelinaceae	<i>Commelina benghalensis</i> L.	H	
78.	Commelinaceae	<i>Murdannia spirata</i> G.Brückn	H	
79.	Convolvulaceae	<i>Evolvulus alsinoides</i> (L.) L.	H	
80.	Convolvulaceae	<i>Ipomoea carnea</i> Jacq.	S	
81.	Crassulaceae	<i>Tillaea schimperii</i> (Fish & Meyers) Gillbert, Ohba & Fu	H	
82.	Cucurbitaceae	<i>Momordica dioica</i> Roxb. ex Willd.	C	
83.	Cucurbitaceae	<i>Coccinia grandis</i> (L.) Voigt	C	
84.	Cucurbitaceae	<i>Cucumis setosus</i> Cogn.	C	+
85.	Cyperaceae	<i>Bulbostylis densa</i> Hand.-Mazz.	H	
86.	Cyperaceae	<i>Cyperus difformis</i> L.	H	
87.	Cyperaceae	<i>Cyperus iria</i> L.	H	
88.	Dioscoreaceae	<i>Dioscorea bulbifera</i> L.	C	
89.	Dioscoreaceae	<i>Dioscoria pentaphylla</i> L.	C	
90.	Eriocaulaceae	<i>Eriocaulon minutum</i> Hook.f.	H	
91.	Euphorbiaceae	<i>Euphorbia hirta</i> L.	H	
92.	Euphorbiaceae	<i>Euphorbia antiquorum</i> L.	S	
93.	Euphorbiaceae	<i>Euphorbia acaulis</i> Roxb.	H	
94.	Fabaceae	<i>Abrus precatorius</i> L.	C	

95.	Fabaceae	<i>Cassia fistula</i> L.	T	
96.	Fabaceae	<i>Senna tora</i> (L.) Roxb.	H	
97.	Fabaceae	<i>Vachellia nilotica</i> (L.) P.J.H.Hurter & Mabb.	T	
98.	Fabaceae	<i>Vigna aconitifolia</i> (Jacq.) Marechal	H	
99.	Fabaceae	<i>Gliricidia sepium</i> (Jacq.) Steud.	T	
100.	Fabaceae	<i>Crotalaria juncea</i> L.	H	
101.	Fabaceae	<i>Crotalaria hirsuta</i> Willd.	H	
102.	Fabaceae	<i>Crotalaria pallida</i> Ait.	H	
103.	Fabaceae	<i>Millettia pinnata</i> (L.) Panigrahi	T	
104.	Fabaceae	<i>Vigna radiata</i> L.	H	
105.	Fabaceae	<i>Vigna khandalensis</i> (Santapau) Raghavan et Wadhwa	H	+
106.	Fabaceae	<i>Desmodium neomexicanum</i> A. Gray	H	+
107.	Fabaceae	<i>Vigna indica</i> T.M.Dixit, K.V.Bhat & S.R.Yadav	H	
108.	Fabaceae	<i>Ougeinia oojeinensis</i> (Roxb.) Hochr.	T	
109.	Fabaceae	<i>Dalbergia sissoo</i> Roxb.	T	
110.	Fabaceae	<i>Leucaena leucocephala</i> (Lam.) de Wit	T	
111.	Fabaceae	<i>Vachellia leucophloea</i> (Roxb.) Maslin, Seigler & Ebinger	T	
112.	Fabaceae	<i>Tamarindus indica</i> L.	T	
113.	Fabaceae	<i>Cassia absus</i> L.	H	
114.	Fabaceae	<i>Vigna unguiculata</i> (L.) Walp.	H	
115.	Fabaceae	<i>Bauhinia racemosa</i> Lam.	H	
116.	Fabaceae	<i>Alysicarpus rugosus</i> (Willd.) DC.	H	
117.	Fabaceae	<i>Alysicarpus belgaumensis</i> Wight	H	
118.	Fabaceae	<i>Cajanus lineatus</i> Graham	H	
119.	Fabaceae	<i>Smithia bigemina</i> Dalzell	H	+
120.	Fabaceae	<i>Smithia setulosa</i> Dalzell	H	+
121.	Gentianaceae	<i>Canscora diffusa</i> (Vahl) R. Br.	H	
122.	Lamiaceae	<i>Plectranthus barbatus</i> (Andrews) Benth. ex G.Don	H	
123.	Lamiaceae	<i>Plectranthus mollis</i> (Aiton) Spreng.	H	
124.	Lamiaceae	<i>Lavandula bipinnata</i> (Roth) Kuntze	H	
125.	Lamiaceae	<i>Leucas aspera</i> (Willd.) Link	H	
126.	Lamiaceae	<i>Clerodendrum serratum</i> (L.) Moon.	S	
127.	Lamiaceae	<i>Colebrookea oppositifolia</i> Sm.	S	
128.	Lentibulariaceae	<i>Utricularia bisquamata</i> Schrank	H	
129.	Linaceae	<i>Linum mysorense</i> Heyne ex Benth. apud Lindl.	H	
130.	Lythraceae	<i>Rotala floribunda</i> (Wight) Koehne	H	
131.	Malvaceae	<i>Helicteres isora</i> L.	S	
132.	Malvaceae	<i>Grewia asiatica</i> L.	T	
133.	Malvaceae	<i>Helicteres isora</i> L.	S	
134.	Malvaceae	<i>Sida rhombifolia</i> L.	H	
135.	Malvaceae	<i>Sida acuta</i> Burm.f.	H	
136.	Malvaceae	<i>Malvastrum coromandelianum</i> (L.) Garcke	H	
137.	Malvaceae	<i>Urena lobata</i> L.	H	
138.	Martyniaceae	<i>Martynia annua</i> L.	H	
139.	Menispermaceae	<i>Tinospora cordifolia</i> Miers.	C	
140.	Moraceae	<i>Ficus religiosa</i> L.	T	
141.	Moraceae	<i>Ficus racemosa</i> L.	T	
142.	Moraceae	<i>Ficus benghalensis</i> L.	T	
143.	Myrtaceae	<i>Eucalyptus cladocalyx</i> E. Muell.	T	
144.	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels.	T	
145.	Orchidaceae	<i>Habenaria grandifloriformis</i> Blatt. & McCann	H	+
146.	Orchidaceae	<i>Habenaria rariflora</i> A.Rich.	H	+
147.	Orchidaceae	<i>Habenaria foliosa</i> A.Rich.	H	+
148.	Orobanchaceae	<i>Sopubia delphinifolia</i> (L.) G.Don	H	
149.	Orobanchaceae	<i>Striga sulphurea</i> Dalzell	H	
150.	Orobanchaceae	<i>Striga gesnerioides</i> (Willd.)	H	
151.	Papaveraceae	<i>Argemone mexicana</i> L.	H	
152.	Pedaliaceae	<i>Sesamum orientale</i> L.	H	
153.	Phyllanthaceae	<i>Phyllanthus niruri</i> L.	H	
154.	Phyllanthaceae	<i>Phyllanthus emblica</i> L.	T	
155.	Plumbaginaceae	<i>Plumbago zeylanica</i> L.	H	
156.	Poaceae	<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	H	
157.	Poaceae	<i>Setaria parviflora</i> (Poir.) Kerguelen	H	
158.	Poaceae	<i>Tripogon capillatus</i> Jaub. & Spach	H	
159.	Poaceae	<i>Themeda quadrivalvis</i> (L.) Kuntze	H	
160.	Poaceae	<i>Dendrocalamus strictus</i> (Roxb.) Nees	T	
161.	Poaceae	<i>Eleusine indica</i> (L.) Gaertn.	H	
162.	Poaceae	<i>Pseudodichanthium serrafalcoides</i> (Cooke & Stapf) Bor	H	+
163.	Poaceae	<i>Rottboellia cochinchinensis</i> (Lour.) Clayton	H	

164.	Poaceae	<i>Eulalia fimbriata</i> (Hack.) Kuntze	H	+
165.	Poaceae	<i>Chrysopogon zizanioides</i> (L.) Roberty	H	
166.	Poaceae	<i>Arthraxon meeboldii</i> Stapf	H	
167.	Poaceae	<i>Echinochloa colona</i> (L.) Link	H	
168.	Poaceae	<i>Dichanthium annulatum</i> (Forssk.) Stapf	H	
169.	Poaceae	<i>Aristida setacea</i> Retz.	H	
170.	Poaceae	<i>Andropogon pumilus</i> Roxb.	H	
171.	Poaceae	<i>Cymbopogon martinii</i> (Roxb.) Wats.	H	
172.	Poaceae	<i>Heteropogon polystachyus</i> (Roxb.) Schult.	H	
173.	Poaceae	<i>Digitaria marginata</i> Link	H	
174.	Poaceae	<i>Brachiaria eruciformis</i> (Sm.) Griseb.	H	
175.	Poaceae	<i>Paspalum caespitosum</i> Flügge	H	
176.	Poaceae	<i>Paspalum floridanum</i> Michx.	H	
177.	Poaceae	<i>Echinochloa crus-galli</i> (L.) Beauv	H	+
178.	Poaceae	<i>Sacciolepis myosuroides</i> (R.Br.) A.Camus	H	
179.	Poaceae	<i>Setaria homonyma</i> (Steud.) Chiov.	H	
180.	Poaceae	<i>Cenchrus ciliaris</i> L.	H	
181.	Poaceae	<i>Arundinella tenella</i> Nees ex Steud.	H	
182.	Poaceae	<i>Arundinella spicata</i> Dalzell	H	
183.	Poaceae	<i>Sporobolus capillaris</i> Miq.	H	
184.	Poaceae	<i>Eragrostis tenella</i> (L.) P.Beauv. ex Roem. & Schult.	H	
185.	Poaceae	<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.	H	
186.	Poaceae	<i>Eragrostis ciliaris</i> (L.) R.Br.	H	
187.	Poaceae	<i>Eragrostis minor</i> Host, Gram.	H	
188.	Poaceae	<i>Microchloa indica</i> (L.f.) P.Beauv.	H	
189.	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	H	
190.	Polygalaceae	<i>Polygala chinensis</i> L.	H	
191.	Polygalaceae	<i>Polygala erioptera</i> DC.	H	
192.	Primulaceae	<i>Anagallis arvensis</i> L.	H	+
193.	Ranunculaceae	<i>Clematis triloba</i> A.St.-Hil.	C	
194.	Rhamnaceae	<i>Zizipus rugosa</i> Lam	T	
195.	Rubiaceae	<i>Hedyotis corymbosa</i> (L.) Lam.	H	+
196.	Rubiaceae	<i>Hedyotis nagpurensis</i> (Brace ex Haines) K.K.Sharma & S.K.Sharm	H	
197.	Rubiaceae	<i>Spermadictyon suaveolens</i> Roxb.	S	
198.	Rubiaceae	<i>Pavetta indica</i> L.	S	
199.	Rutaceae	<i>Chloroxylon swietenia</i> DC.	T	
200.	Sapindaceae	<i>Cardiospermum halicacabum</i>	C	
201.	Solanaceae	<i>Lycopersicon esculentum</i> Mill.	H	
202.	Sterculiaceae	<i>Sterculia urens</i> Roxb.	T	
203.	Typhaceae	<i>Typha angustifolia</i> L.	H	
204.	Verbenaceae	<i>Tectona grandis</i> L.f.	T	
205.	Verbenaceae	<i>Lantana camara</i> L.	T	
206.	Vitaceae	<i>Leea indica</i> (Burm.f.) Merr.		
207.	Vitaceae	<i>Cissus woodrowii</i> (Stapf ex Cooke) Santapau	S	
208.	Zingiberaceae	<i>Curcuma pseudomontana</i> J.Graham	H	
209.	Pteridaceae	<i>Adiantum caudatum</i> Klotzsch	H	
210.	Pteridaceae	<i>Adiantum fimbriatum</i> Christ	H	
211.	Pteridaceae	<i>Actiniopteris radiata</i> (J. Koenig ex Sw.) Link	H	
212.	Pteridaceae	<i>Cheilanthes farinosa</i> (Forssk.) Kaulf.	H	
213.	Selaginellaceae	<i>Selaginella repanda</i> (Desv. & Poir.) Spring	H	

Note: Herb- H, Shrub- S, Tree- T, Climber- C, Endemis- +



Fig 1: Vegetation during rainy



Fig 2: Vegetation during rainy



Fig 3: This is the only location for *Tillaea schimperi* (C. A. Mey.)
M. G. Gilbert, H. Ohba & K. T. Fu in Maharashtra and central India

Conclusion

1. Present study revealed that the study area has considerable floristic diversity.
2. The forest type goes to open grassland of savanna type, having more herbs and shrub and trees is very negligible.
3. It harbours some unique elements like, *Cheilanthes albomarginata*, *Tillaea schimperi* and others indicating the predominance of cooler climatic conditions in the near past.
4. Considering these facts the study area is a significant with respect to floristic diversity in the Northern Western Ghats.

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