Chapter: IV

RESULTS & DISCUSSION

A. Vegetation at Jarandeshwar hill:

The vegetation at Jarandeshwar hill is dry deciduous type. It is composed of 233 species of plants (table 3). Dry element of vegetation is represented by species of *Acacia leucophloea, Agave americana, Albizia procera, Carissa carandus, Echinops echinatus, Lantana camara,* and *Lepidagathis trinervis* while deciduous element is shared by all the tree species.

Table -3: Vegetation at Jarandeshwar hill.

Sr. No.	Botanical Name	Family	Habit	Sides
1.	*Ceropegia hirsuta*Wt. & Arn	Asclepiadaceae	C	+++
2.	*Gymnema sylvestre* (Retz.) R.Br.	Asclepiadaceae	C	+++
3.	*Hemidesmus indicus* (L.) Schult.	Asclepiadaceae	C	++++
4.	*Leptadenia reticulata* (Retz.) Wt &Arn.	Asclepiadaceae	C	+++
5.	*Tylophora dalzellii* Hook. f.	Asclepiadaceae	C	++
6.	*Wattakaka volubilis* (L. f.) Stap f.	Asclepiadaceae	C	++
7.	*Capparis grandiflora* Wall.	Capparaceae	C	++
8.	*Celastrus paniculatus* Willd.	Celastraceae	C	++
9.	*Ipomoea eriocarpa* R.Br.	Convolvulaceae	C	++
10.	*Ipomoea indica* (Burm.)f.	Convolvulaceae	C	++++
11.	*Cucumis setosus* L	Cucurbitaceae	C	+
12.	*Memordica dioica* Roxb.	Cucurbitaceae	C	++
13.	*Dioscoria pentaphylla* L.	Dioscoriaceae	C	++++
14.	*Abrus precatorius* L.	Fabaceae	C	++
15.	*Butea superba* Roxb.	Fabaceae	C	++
16.	*Cajanus scarabaeodes* (L.) Du Petit-Thou	Fabaceae	C	+
17.	*Clitoria ternatea* L.	Fabaceae	C	+++
18.	*Teramnus labialis* (L.f.) Spreng	Fabaceae	C	+++
19.	*Teramnus repens* ssp. gracilis (Chiov.) Verdc.	Fabaceae	C	++
20.	*Vigna aconitifolia* (Jacq.) Morehal.	Fabaceae	C	++
21.	*Vigna trilobata* (L.) Verd.	Fabaceae	C	+
22.	*Asparagus racemosus* Willd.	Liliaceae	C	+++
23.	*Aspidopteris cordata* (Heyne) A. A. Juss..	Malphighiaceae	C	+++
24.	*Cardiospermum halicacabum* L.	Menispermaceae	C	++++
25.	*Cissampelos pareira* L.	Menispermaceae	C	++++
26.	*Cocculus hirsutus* (L.) Theob	Menispermaceae	C	++++
27.	*Cyclea peltata* (Lamk.) Hook. F. Thoms.	Menispermaceae	C	+
28.	*Mimosa pudica* L.	Mimosaceae	C	++
29.	*Jasminum auriculatum* Vahl.	Oleaceae	C	+++
30.	*Jasminum roxburgianum* Wall.	Oleaceae	C	+++
31.	*Cryptolepis buchanani* Roem & Schult.	Periplocaceae	C	+++-
32.	*Clematis gouriana* Roxb.	Rananculaceae	C	+++
33.	*Clematis heynei* M.A. Rau	Rananculaceae	C	+++-
34.	*Ventilago denticulata* Willd.	Rhamnaceae	C	+++
35.	*Ventilago maderaspatana* Gaertn.	Rhamnaceae	C	+++
36.	*Smilax zeylanica* L.	Smilacaceae	C	+++
37.	*Cissus repens* Lamk.	Vitaceae	C	+++
38.	*Andrographis paniculata* (Burm. f.)Wall.	Acanthaceae	H	++++
39.	*Blepharis maderaspatensis* (L.) Roth	Acanthaceae	H	++++
40.	*Eranthemum rosium* (Vahl) R. Br.	Acanthaceae	H	++
41.	*Justicia latispica* (Cl.) Gamble.	Acanthaceae	H	++++
42.	*Nilgirianthus heyneanus* (Nees)	Acanthaceae	H	++++
43.	*Pleocaulus ritchiei* (Cl.) Bremek	Acanthaceae	H	+++
44.	*Rostellularia quinqueangularis* (Koen.) Nees	Acanthaceae	H	++

45.	*Rungia elegans Dalz.*	Acanthaceae	**H**	++++
46.	*Rungia repens* (L.). Nees.	Acanthaceae	**H**	+++
47.	*Agave americana*	Agavaceae	**H**	++
48.	*Altrenthera sessilis* (L.) R.Br.	Amaranthaceae	**H**	++++
49.	*Celosia argentea* L.	Amaranthaceae	**H**	+
50.	*Pimpinella adscendens* Dalz.	Apiaceae	**H**	+++
51.	*Pimpinella wallichiana* (Miq.) Gandhi	Apiaceae	**H**	+
52.	*Pinda concanese* Dalz.	Apiaceae	**H**	++
53.	*Acanthospermum hispidum* DC.	Asteraceae	**H**	+++
54.	*Ageratum conyzoides* L.	Asteraceae	**H**	++++
55.	*Blainvillea acmella* (L) Philipson.	Asteraceae	**H**	+++
56.	*Blumea malcolmii* (Cl.) Hook. f.	Asteraceae	**H**	+++
57.	*Cosmos bipinnatus* Cav.	Asteraceae	**H**	++++
58.	*Cyathocline purpurea* (Buch-Ham) O. Ktze.	Asteraceae	**H**	+
59.	*Echinops echinatus* Roxb.	Asteraceae	**H**	+++
60.	*Lagascea mollis* Cav.	Asteraceae	**H**	+++
61.	*Pentanema indicum* (L.) Ling	Asteraceae	**H**	+
62.	*Pulicaria wightiana* (DC.) Cl.	Asteraceae	**H**	+
63.	*Scenecio edgeworthii* Hook.f.	Asteraceae	**H**	+++
64.	*Synedrella nodiflora* (L.) Gaertn.	Asteraceae	**H**	++++
65.	*Tricholepis radicans* (Roxb.) DC.	Asteraceae	**H**	+++
66.	*Tridax latispica* L.	Asteraceae	**H**	++
67.	*Impetiens balsamina* L.	Balsaminaceae	**H**	+++
68.	*Trichodesma zeylanicum* (Burm. F.) R. Br.	Boraginaceae	**H**	++++
69.	*Cassia absus* L.	Caesalpiniaceae	**H**	++
70.	*Cassia mimosoides* L.	Caesalpiniaceae	**H**	++
71.	*Wahlenbergia marginata* (Thunb.) DC.	Campanulaceae	**H**	++
72.	*Cyanotis tuberosa* J.A.& J.H.Schult	Commelinaceae	**H**	++
73.	*Convolvulus rottlerianus* Chofy.	Convolvulaceae	**H**	++++
74.	*Evolvulus alsinoides* (L.)L	Convolvulaceae	**H**	+++
75.	*Kalanchoe bhidei* Cooke.	Crassuliaceae	**H**	+
76.	*Cyperus compressus* L.	Cyperaceae	**H**	++
77.	*Cyperus diformis* L.	Cyperaceae	**H**	++
78.	*Cyperus iria* L.	Cyperaceae	**H**	+
79.	*Fimbristylis microcarya* Muell.	Cyperaceae	**H**	+++
80.	*Pycreus flavidus* var. flavidus (Retz.) T. Koyama	Cyperaceae	**H**	+
81.	*Eriocaulon conicum* (Fyson) Fischer	Eriocaulaceae	**H**	+
82.	*Euphorbia geniculata* Orteg.	Euphorbiaceae	**H**	+++
83.	*Euphorbia hirta* L.	Euphorbiaceae	**H**	++
84.	*Phylanthus amarus* Schumach & Thonn	Euphorbiaceae	**H**	+
85.	*Alysicarpus longifolius* (Rottl.) Whight & Arn.	Fabaceae	**H**	++++
86.	*Alysicarpus pubescens* var. pubescens	Fabaceae	**H**	+++
87.	*Alysicarpus tetragonolobus* Edgew.	Fabaceae	**H**	+++
88.	*Cajanus crassus* (Prain & King) Van der Maesen.	Fabaceae	**H**	++
89.	*Crotalaria hebecarpa* (DC.) Rudd.	Fabaceae	**H**	++
90.	*Crotalaria medicaginea* var. neglecta Lam.	Fabaceae	**H**	+++
91.	*Crotalaria orixensis* Willd.	Fabaceae	**H**	+++
92.	*Desmodium heterocarpon* (L.) DC	Fabaceae	**H**	+++
93.	*Desmodium scorpiurus* (Sw.) Desv.	Fabaceae	**H**	+++
94.	*Desmodium velutinum* (Willd.)DC.	Fabaceae	**H**	++
95.	*Dipteracanthus patulus* (Jacq.) Nees	Fabaceae	**H**	+
96.	*Echinocloa colona* Link.	Fabaceae	**H**	++
97.	*Indigofera cordifolia* Heyne	Fabaceae	**H**	+++
98.	*Indigofera linifolia* (L.f.) Retz.	Fabaceae	**H**	++
99.	*Neonotonia wightii* (Wight & Arn.) Lackey	Fabaceae	**H**	++

100.	*Pseudarthria viscida* (L.) Wt. & Arn.	Fabaceae	**H**	+++
101.	*Zornia gibbosa* Span.	Fabaceae	**H**	++
102.	*Exacum lawii* C.B. Cl.	Gentianaceae	**H**	+
103.	*Curculigo orchioides* Gaertn	Hypoxidaceae	**H**	++
104.	*Lavandula bipinnata* (Roth.) O. Ktze.	Lamiaceae	**H**	+++
105.	*Lepidagathis trinervis* Nees	Lamiaceae	**H**	+++
106.	*Ocimum americanum* L.	Lamiaceae	**H**	+++
107.	*Chlorophytum glaucum* Dalz.	Liliaceae	**H**	++++
108.	*Linum mysurense* Heyne	Linaceae	**H**	++
109.	*Lobelia alsinoides* Lam.	Lobeliaceae	**H**	+++
110.	*Ammania buccifera* L.	Lythraceae	**H**	+++
111.	*Abelmoscus manihot* (L.) Medik.	Malvaceae	**H**	++
112.	*Abitulon indicum* (L.)	Malvaceae	**H**	++
113.	*Malvastrum coromandelianum* (L.) Garcke	Malvaceae	**H**	+
114.	*Pavonia zeylanica* (L.) Cav	Malvaceae	**H**	+
115.	*Sida mysurensis* Wt & Arn.	Malvaceae	**H**	+++
116.	*Boerhavia repens* L. var. diffusa Moorthy	Nyctaginaceae	**H**	+++
117.	*Biophytum helenae* Busc. Muschl.	Oxalidaceae	**H**	++
118.	*Oxalis corniculata* L.	Oxalidaceae	**H**	+
119.	*Argemone mexicana* L.	Papavaraceae	**H**	+++
120.	*Sesamum orientale* L.	Pedaliaceae	**H**	+++
121.	*Andropogon pumilus* Roxb.	Poaceae	**H**	++++
122.	*Apluda mutica* L.	Poaceae	**H**	++++
123.	*Aristida funiculata* Trin. & Rupr.	Poaceae	**H**	++++
124.	*Aristida redacta* Stapf.	Poaceae	**H**	+
125.	*Arthraxon hispidus* Maklno var. hispidus	Poaceae	**H**	++
126.	*Arthraxon lanceolatus* Hochst. Var. lanciolatus	Poaceae	**H**	+
127.	*Arundinella tuberculata* Lisboa	Poaceae	**H**	++
128.	*Chionachnae koenigii* (Spr.) THw.	Poaceae	**H**	++
129.	*Chloris virgata* Swartz.	Poaceae	**H**	++++
130.	*Chrysopogon polyphyllus* Blatt. & Mc C.	Poaceae	**H**	+++
131.	*Dactyloctenium aegyptium* willd.	Poaceae	**H**	++
132.	*Heteropogon contartus* R. & S.	Poaceae	**H**	++++
133.	*Iseilema prostratum* (L.) Andress	Poaceae	**H**	+
134.	*Lophopogon tridentatus* Hack.	Poaceae	**H**	+
135.	*Melanochenchrus jaquemontii* Jaub. & Spach	Poaceae	**H**	++
136.	*Sehima ischemoides* Forssk.	Poaceae	**H**	++++
137.	*Sporobolus indicus*	Poaceae	**H**	++++
138.	*Theleopogon elegans* R.& S.	Poaceae	**H**	++++
139.	*Themeda quadrivalvis* Ktze.	Poaceae	**H**	++++
140.	*Tripogon bromoides* R. & S.	Poaceae	**H**	+
141.	*Polygala persicariifolia* DC	Polygalaceae	**H**	++
142.	*Delphinium mulabaricum* Huth.	Rananculaceae	**H**	+++
143.	*Spermacoce pusilla* Wall.	Rubiaceae	**H**	+++
144.	*Osyris quadripartita* Salz.	Santalaceae	**H**	++
145.	*Buchnera hispida* Buch-Ham.	Scrophulariaceae	**H**	++++
146.	*Sopubia delphinifolia* (L.) G. Don	Scrophulariaceae	**H**	++
147.	*Striga gesnerioides* (Willd.) Vatke	Scrophulariaceae	**H**	+++
148.	*Solanum nigrum* L.	Solanaceae	**H**	+
149.	*Corchorus deccanensis* H.B. Singh and Vishwanathan	Tiliaceae	**H**	++++
150.	*Barleria gibsoni* Dalz.	Acanthaceae	**S**	++
151.	*Rhus sinuata* Thumb.	Anacardiaceae	**S**	+++
152.	*Carissa carandas* L.	Apocynaceae	**S**	++
153.	*Cassia auriculata* L.	Caesalpiniaceae	**S**	++
154.	*Cassia occidentalis* L.	Caesalpiniaceae	**S**	++
155.	*Cassia surattensis* Burm.f.	Caesalpiniaceae	**S**	+

156.	*Cassia tora* L.	Caesalpiniaceae	**S**	++
157.	*Cassia uniflora* Mill	Caesalpiniaceae	**S**	++
158.	*Capparis decidua* (Forssk.) Edg.	Capparaceae	**S**	++
159.	*Capparis rotundifolia* Rottl.	Capparaceae	**S**	++
160.	*Indigofera tinctoria* L.	Fabaceae	**S**	++
161.	*Tephrosia purpurea* (L.) Pers.	Fabaceae	**S**	+++
162.	*Gloriosa superba* L.	Liliaceae	**S**	+
163.	*Lawsonia inermis* L.	Lythraceae	**S**	+
164.	*Woodfordia fruticosa* (L.) Kurz.	Lythraceae	**S**	+++
165.	*Plumbago zeylanica* L.	Plumaginaceae	**S**	++
166.	*Ixora nigricans* R Br.	Rubiaceae	**S**	++++
167.	*Spermadictyon sauveolens* Roxb.	Rubiaceae	**S**	++
168.	*Datura metel* L.	Solanaceae	**S**	+
169.	*Gnidia glauca* (Fresen.) Gilg.	Thymelaeaeceae	**S**	+
170.	*Grewia orbiculata* Rott.	Tiliaceae	**S**	++++
171.	*Grewia serrulata* DC.	Tiliaceae	**S**	++++
172.	*Clerodendrum serratum* (L.) Moon.	Verbenaceae	**S**	+++
173.	*Lantana camera* L.	Verbenaceae	**S**	+
174.	*Maytenus rothiana* (Walp.) Lobereau-Collen	Celastraceae	**S**	+
175.	*Buchanania cochinchinensis* Lour	Anacardiaceae	**T**	+
176.	*Lannea coromandelica (*Houtt.) Merr.	Anacardiaceae	**T**	+++
177.	*Holarrhenna pubescens*. Buch.-Ham.)Wall	Apocynaceae	**T**	++
178.	*Plumeria rubra* L.	Apocynaceae	**T**	+
179.	*Wrightia tinctoria* R.Br.	Apocynaceae	**T**	++
180.	*Dolichandrone falcata* (Wall). Seem	Bignoniaceae	**T**	++
181.	*Heterophragma quadriloculare* Roxb.	Bignoniaceae	**T**	++
182.	*Bombax ceiba* L.	Bombacaceae	**T**	++
183.	*Cordia dichotoma* Forst. f. dich	Boraginaceae	**T**	+++
184.	*Boswellia serrata* Roxb.	Burseraceae	**T**	++++
185.	*Bauhinia racemosa* Lamk.	Caesalpiniaceae	**T**	++++
186.	*Cassia fistula* L.	Caesalpiniaceae	**T**	+++
187.	*Cassia siamea* Lamk.	Caesalpiniaceae	**T**	+
188.	*Pongamia pinnata* L.	Caesalpiniaceae	**T**	+
189.	*Tamarindus indica* L.	Caesalpiniaceae	**T**	+
190.	*Cassine glauca* (Rottb.) O. Ktze.	Celastraceae	**T**	++
191.	*Maytenus senegalensis* (Lam.) Excell.	Celastraceae	**T**	++++
192.	*Anogeissus latifolia* (Roxb.) Wall.	Combretaceae	**T**	++++
193.	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	**T**	+
194.	*Terminalia chebula* Retz.	Combretaceae	**T**	++
195.	*Terminalia elliptica* Will	Combretaceae	**T**	++++
196.	*Diospyros melanoxylon* Roxb.	Ebenaceae	**T**	+++
197.	*Diospyros oocarpa* Thw.	Ebenaceae	**T**	++++
198.	*Bridelia retusa* L.	Euphorbiaceae	**T**	++++
199.	*Emblica officinalis* Gaertn.	Euphorbiaceae	**T**	+++
200.	*Jatropha curcas* L.	Euphorbiaceae	**T**	+
201.	*Butea monosperma* Lamk.	Fabaceae	**T**	+
202.	*Dalbergia latifolia* Roxb.	Fabaceae	**T**	++
203.	*Dalbergia sissoo* Roxb.	Fabaceae	**T**	+++
204.	*Glyricidia sepium* Jacq.	Fabaceae	**T**	+
205.	*Ougeinia oojeinensis* (Hochr.)	Fabaceae	**T**	++
206.	*Pterocarpous marsupium* Roxb.	Fabaceae	**T**	+
207.	*Sesbania sesban* (L.) Merr.	Fabaceae	**T**	+
208.	*Casearia graveolens* Dalz.	Flacourtiaceae	**T**	+++
209.	*Flacourtia indica* (Burm.f.) Merr.	Flacourtiaceae	**T**	+++
210.	*Chloroxylon swietenia* DC.	Flindersiaceae	**T**	++
211.	*Lagerstroemia parviflora* Roxb.	Lythraceae	**T**	+++
212.	*Azadirachta indica* A. Juss.	Meliaceae	**T**	++++
213.	*Acacia catechu* (L.f.) Willd	Mimosaceae	**T**	+

214.	*Acacia chundra* Roxb	Mimosaceae	**T**	+++
215.	*Acacia leucophloea* Roxb.	Mimosaceae	**T**	++
216.	*Acacia nilotica* L.	Mimosaceae	**T**	+
217.	*Albizia amara Roxb.*	Mimosaceae	**T**	++++
218.	*Albizia lebbek* (L) Bth.	Mimosaceae	**T**	++
219.	*Albizia procera* (Roxb.) Bth.	Mimosaceae	**T**	++++
220.	*Leucaena latisiliqua* (L.)Gillis	Mimosaceae	**T**	+
221.	*Ficus amplissima* J.E.Smith	Moraceae	**T**	+
222.	*Ficus benghalensis* L.	Moraceae	**T**	+
223.	*Ficus racemosa* L.	Moraceae	**T**	++
224.	*Ficus religiosa* L.	Moraceae	**T**	+++
225.	*Syzigium cumini* L.	Myrtaceae	**T**	+
226.	*Ziziphus caracutta* Roxb.	Rhamnaceae	**T**	++++
227.	*Ziziphus mauritiana* Lamk.	Rhamnaceae.	**T**	++
228.	*Meyna laxiflora* Robyns.	Rubiaceae	**T**	+++
229.	*Santalum album* L.	Santalaceae	**T**	+
230.	*Sterculia urens* Roxb.	Sterculiaceae	**T**	++
231.	*Grewia tilifolia* Vahl.	Tiliaceae	**T**	++++
232.	*Tectona grandis* L.f.	Verbinaceae	**T**	+++
233.	*Cissus woodrowii* (Stapf) Sant.	Vitaceae	**T**	++

Table- 4: Site wise distribution of vegetation at Jarandeshwar Hill.

Sr. No.	No. of sides of hill	Trees	Shrubs	Climbers	Herbs	Total
1.	1 (+)	18	06	04	21	49
2.	2 (++)	15	12	11	32	70
3.	3 (+++)	13	05	14	35	67
4.	4 (++++)	12	03	08	24	47

Vegetation appears rich and luxuriant at east and south sides of the hill. 47 species were represented on all the four sides. It is composed of 12 trees, 03 shrubs, 08 climbers and 24 herbs. 49 plant species of the total are represented on only one side of the hill. They include 18 trees, 06 shrubs, 4 climber and 21 herbs. 70 and 67 species were represented on any two and three sides of the hill respectively (Table 4).

First five dominant families with their number of genera and species from the study area were Fabaceae (21 genera and 34 species), Poaceae (16 genera and 20 species), Asteraceae (14 genera and 14 species), Caesalpinaceae (04 genera and 12 species) and Acanthaceae with 09 genera and 10 species. Twenty nine families were represented by single genus and species.

Composition of vegetation reveals that, Poaceae, Asteraceae are the main herb contributing families, while trees were mostly contributed by family Combretaceae, shrubs and climbers are contributed by Rubiaceae and Fabaceae, Menispermaceae respectively on all sides of the hill.

Due to extreme climatic condition, seasonal variation in the flora was significant. Most of the herbs start their life-cycle by the beginning of monsoon and complete by the end of winter, while still others may be seen only up to the end of September. Some of them, however, can withstand cold weather and many continue to grow up to April, In general the number of species is largest during October and smallest during April- May.

There is a sudden rise in the number of species after the first showers of monsoon. Bulbuous plants and ephemerals like *Curculigo orchioides, Arisaema caudatum and Scila hycinthina* emerge and come to flower, some of them even before the leaves appear. Soon after that, in a week or two, a variety of grasses and other species sprout up and the entire ground becomes green. The common Poaceae members are *Apluda mutica Heteropogon contortus Themeda quadrivalvis,* and *a*nd grass species like *Aristida funiculata Dactyloctenium aegyptium* often forming loose mats.

Most of the vegetation is short lived and they disappear by the end of the rainy season. By this time grasses grow quite tall, some of them occurring in pure or mixed patches and are often spotable by their height, inflorescence etc. from the distance also. By the end of monsoon or a little later species of grasses like *Arthraxon hispidus, Arthraxon lanceolatus, Arundinella tuberculata, Chloris virgata, Chionachnae koenigii,* dry up, but some dicot species like *Barleria gibsoni, Blumea malcolmii Delphinium malabaricum, Rungia pectinata,* becomes dominant at many places and grow gregariously. Grassland composition shows dicot and monocot species which include *Alysicarpus pubescens, Alysicarpous longifolia, Boerhavia diffusa, Chlorophytum glaucum, Crotolaria hebecarpa, Curculigo orchioides, Desmodium heterocarpum ,Lagascea molis, Scenecio edgeworthii, Cynotis denticulata* and grasses. Some of the twiners among the grasses are the members of family Asclepiadaceae, Convolvulaceae, Cucurbitaceae Fabaceae, etc. with the onset of winter most of the grasses like *Apluda mutica, Heteropogon contartus, Themeda quadrivalvis, and Theleopogon elegans* shows gradual drying. As a result the ground becomes exposed showing the barreness of ground vegetation. By the beginning of summer season the ground cover almost disappears. Many trees such as *Bombax ceiba, Bosewelia serrata, Butea monosperma Diospyros melanoxylon, Lannea coromandelica, Tectona grandis* etc. shade their leaves and forest becomes more open and colorful due to flowering.

Fires, illicit cutting of forest trees, overgrazing, encroachment, soil erosion, floods and tourists are the major factors affecting the growth and development of the plants.

Table -5: Life form diversity at Jarandeshwar Hill.

Life form	Number of Species	Percentage of species (%)
Tree	59	25.32
Shrub	26	11.16
Climber	36	15.45
Herbs	112	48.07
Total	**233**	**100**

Table -5 represents Life form diversity at Jarandeshwar Hill. Vegetation composition shows highest percentage of herbs (48. 07%) followed by trees (25.32%). Contribution of other types includes climbers (15.45%) and shrubs (11.16%). Figure 3 shows diagrammatic representation of these values.

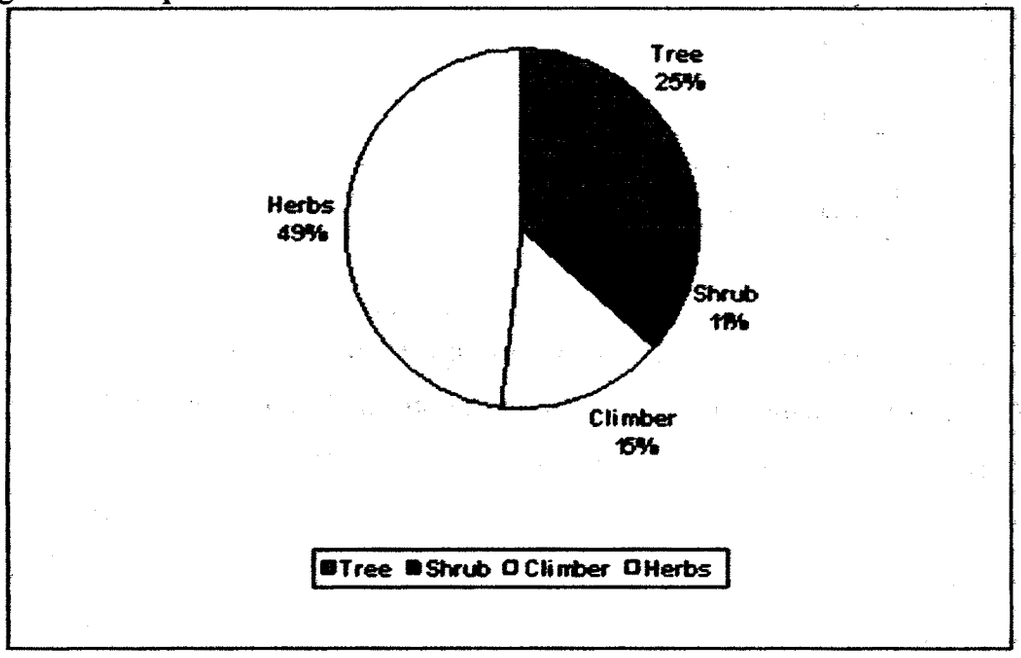

Figure 3: Life form diversity at Jarandeshwar Hill.

Table 6 gives taxonomic diversity of Jarandeshwar hill. The present study enumerates 233 species belonging to 183 genera and 66 families of flowering plants. Vegetation in study area was dominated by dicot species. Study reveals that vegetation is composed of 85.40% dicot and 14.60% monocot plants. Within dicots, Polypetalae are represented by 30 families (45.45%), 74 genera (40.44%), and 112 species (48.07%). These are represented in figure 4.

Table -6: Taxonomic diversity at Jarandeshwar Hill.

Class	Group	Families		Genera		Species	
		No.	%	No.	%	No.	%
Dicotyledons	Polypetalae	30	45.45	74	40.44	112	48.07
	Gamopetalae	21	31.82	67	36.61	71	30.47
	Apetalae	06	09.10	12	06.55	16	06.86
Monocotyledons	Monocot	09	13.63	30	16.39	34	14.60
		66		**183**		**233**	**100**

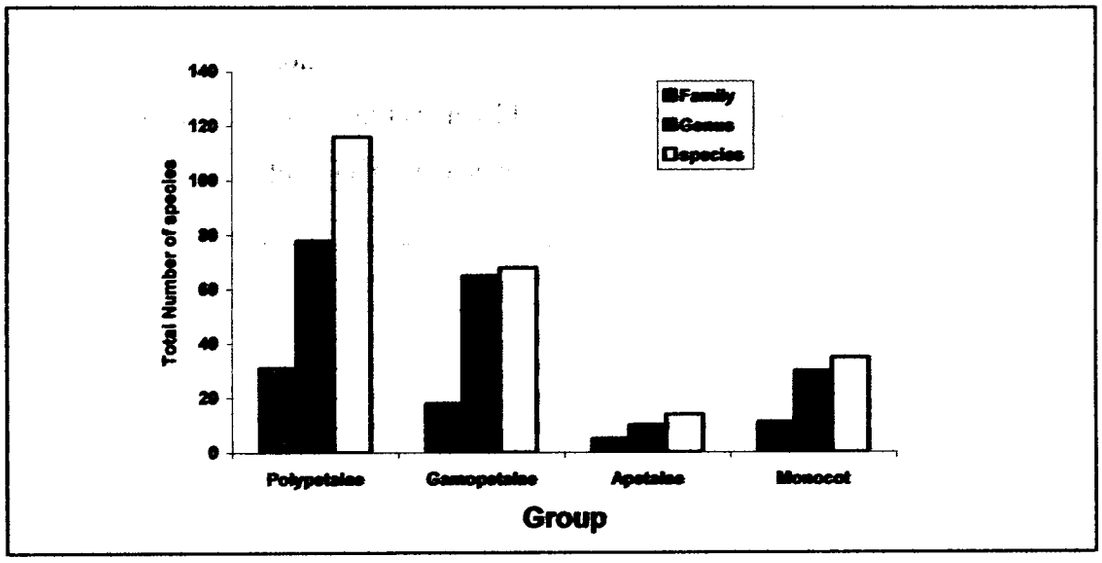

Figure 4: Taxonomic diversity at Jarandeshwar Hill.

Table -7: Life form distribution among different groups at Jarandeshwar Hill.

Group	Trees	Shrubs	Climber	Herbs	Total	%
Polypetalae	40	13	23	36	112	48.06
Gamopetalae	11	10	11	39	71	30.47
Apetalae	08	01	00	07	16	06.86
Monocot	00	02	02	30	34	14.59
	59	**26**	**36**	**112**	**233**	**100**

Table 7 gives an idea of life form distribution in different groups of dicot and monocots. Polypetalae is dominated by trees while gamopetalae and monocots show dominance of herb.

Table – 8: Summary of total dicots and monocots at different sides of the Jarandeshwar Hill.

Sr. No.	Side of the hill	Dicotyledons			Monocotyledons			Total		
		F	G	S	F	G	S	F	G	S
1	East	54	118	149	06	22	25	60	140	174
2	West	52	104	123	04	11	11	56	115	134
3	South	64	128	159	04	15	15	68	143	174
4	North	43	73	80	02	09	09	45	82	87

Table 8 gives total number of dicot and monocot forms at different sides of the Jarandeshwar Hill. East and south side of the hill represents same number of species (174). The south side of the hill shows maximum number of dicotyledonous plants (159) and east side of the hill represents maximum number of monocotyledonous plants (25). Family diversity in dicots is more or less similar at east and west sides, while in monocots west and south sides of the hill shows homogeny in diversity of families. Maximum diversity in dicot families is seen at south side of the hill.

Table -9: Summary of total Trees, Shrubs, Climber and Herb at different sides of the Jarandeshwar Hill.

Sr. No.	Side of the hill	Trees	Shrubs	Climbers	Herbs
1	East	35	19	30	93
2	West	44	11	21	62
3	South	40	19	31	84
4	North	18	08	17	51

Table 9 shows the side wise data of trees, shrubs, herbs, and climbers. East side showed more diversity in the herb species while West side showed more diversity in the tree species. East and South sides of the hill shows similar diversity in the shrubs and climbers (fig. 5)

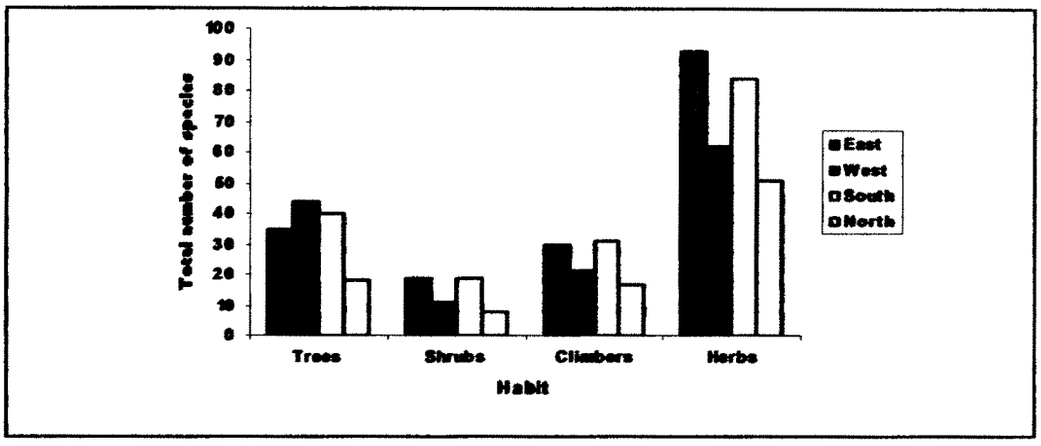

Figure 5. Summary of total Trees, Shrubs, Climbers and Herbs at different sides of the Jarandeshwar Hill.

Table -10: Species contribution of families to the vegetation at Jarandeshwar hill.

Sr. No.	Family	Genera	Species	Percentage (%)
1.	Fabaceae	21	34	14.52
2.	Poaceae	16	20	08.54
3.	Asteraceae	14	14	05.98
4.	Caesalpiniaceae	04	12	05.12
5.	Acanthaceae	09	10	04.27
6.	Mimosaceae	04	09	03.84
7.	Asclepiadaceae	06	06	02.56
8.	Euphorbiaceae	05	06	02.56
9.	Cyperaceae	03	05	02.13
10.	Malvaceae	05	05	02.13
11.	Apocynaceae	04	04	01.71
12.	Combretaceae	02	04	01.71
13.	Convolvulaceae	03	04	01.71
14.	Lythraceae	04	04	01.71
15.	Menispermaceae	04	04	01.71
16.	Moraceae	01	04	01.71
17.	Rhamnaceae	02	04	01.71
18.	Rubiaceae	04	04	01.71
19.	Tiliaceae	02	04	01.71
20.	Celastraceae	03	04	01.71
21.	Anacardiaceae	03	03	01.28

23.	Capparaceae	01	03	01.28
24.	Lamiaceae	03	03	01.28
25.	Liliaceae	03	03	01.28
26.	Rananculaceae	02	03	01.28
27.	Scrophulariaceae	03	03	01.28
28.	Amaranthaceae	02	02	00.85
29.	Bignoniaceae	02	02	00.85
30.	Boraginaceae	02	02	00.85
31.	Cucurbitaceae	02	02	00.85
32.	Ebenaceae	01	02	00.85
33.	Flacourtiaceae	02	02	00.85
34.	Oleaceae	01	02	00.85
35.	Oxalidaceae	02	02	00.85
36.	Santalaceae	02	02	00.85
37.	Solanaceae	02	02	00.85
38.	Verbenaceae	02	02	00.85
39.	Vitaceae	01	02	00.85
40.	Agavaceae	01	01	00.43
41.	Asparagaceae	01	01	00.43
42.	Balsaminaceae	01	01	00.43
43.	Bombacaceae	01	01	00.43
44.	Burseraceae	01	01	00.43
45.	Campanulaceae	01	01	00.43
46.	Commelinaceae	01	01	00.43
47.	Crassuliaceae	01	01	00.43
48.	Dioscoriaceae	01	01	00.43
49.	Eriocaulaceae	01	01	00.43
50.	Flindersiaceae	01	01	00.43
51.	Gentianaceae	01	01	00.43
52.	Hypoxidaceae	01	01	00.43
53.	Linaceae	01	01	00.43
54.	Lobeliaceae	01	01	00.43
55.	Malphighiaceae	01	01	00.43
56.	Meliaceae	01	01	00.43
57.	Myrtaceae	01	01	00.43

58.	Nyctaginaceae	01	01	00.43
59.	Papavaraceae	01	01	00.43
60.	Pedaliaceae	01	01	00.43
61.	Periplocaceae	01	01	00.43
62.	Plumaginaceae	01	01	00.43
63.	Polygalaceae	01	01	00.43
64.	Smilacaceae	01	01	00.43
65.	Sterculiaceae	01	01	00.43
66.	Thymelaeaeceae	01	01	00.43

Table 10 show the species contribution of families at Jarandeshwar hill. It is observed that out of 66 families, 34 families contribute only one genus while 29 families contribute only one species. Families contributing more than five species in descending order are Fabaceae, Poaceae, Asteraceae, Caesalpiniaceae, Acanthaceae, Mimosaceae, Euphorbiaceae, Asclepiadaceae, Cyperaceae and Malvaceae.

Table -11: Comparative account of dominant families from areas adjoining to Jarandeshwar Hill.

Sr. No	Present Study	Mahabaleshwar	Western Ghats of Maharashtra.	Maharashtra State
1	Fabaceae	Poaceae	Poaceae	Poaceae
2	Poaceae	Asteraceae	Fabaceae	Fabaceae
3	Asteraceae	Fabaceae	Orchidacceae	Cyperaceae
4	Caesalpiniaceae	Acanthaceae	Acanthaceae	Acanthaceae
5	Acanthaceae	Rubiaceae	Cyperaceae	Asteraceae
6	Mimosaceae	Euphorbiaceae	Rubiaceae	Orchidaceae
7	Asclepiadaceae	Scrophulariaceae	Asteraceae	Euphorbiaceae
8	**Euphorbiaceae**	Asclepiadaceae	**Euphorbiaceae**	Rubiaceae
9	Cyperaceae	Orchidaceae	Asclepiadaceae	Scrophulariaceae
10	**Malvaceae**	Lamiaceae	Lamiaceae	**Malvaceae**

Table 11 gives comparison of first 10 families from different regional floras of the state of Maharashtra. The first ten families with related flora reveal 70% similarities though their sequence is different. Present study reveals that Fabaceae ranks first in the study area while it ranks second in the flora of Western Ghats of Maharashtra. In the flora of Mahabaleshwar it ranks third. Monocot family stands second in the study area

vegetation but it ranks first in the other three floristic surveys. Euphorbiaceae and Malvaceae are occupying 8th and 10th position in this survey. Surprisingly Euphorbiaceae shows similar rank with Western Ghats of Maharashtra and Malvaceae shows exact similar rank with Maharashtra state.

Discussion:

Ganesh *et al.* (1996), Seetharam *et al.* (1998) Sisodia (2007) Mohite *et al.* (2007) made similar studies of vegetation in different regions.

Ganesh *et al.* reported 173 species belonging to 58 families from Mundanthurai tiger reserve forest. The proportion of life form in the flora was trees (51.44%), shrubs (28.90%), herbs (10.98%) and climbers (8.67%). Seetharam *et al.* reported 68.33% herbs and 21.66% trees from dry deciduous forest of Sandur. Tripathi and others listed 148 plant species of 77 families from Syiem sacred groove of Meghalaya. Study revealed dominance of trees in the vegetation (45.08%), followed by shrubs (26.58%) and herbs (13.87%) Sisodia reported dominance of herbs (48.57%) followed by trees (24.87%) from Gir National park of Gujarat.

In the present work herbs (47.86%) shows dominance over other life forms viz. trees (25.22%), shrubs (11.11%) and climber (15.81). Similar conclusions have been obtained by the work of Seetharam *et al.* and Sisodia. Ganesh *et al.* and Tripathi *et al.* shows dominance of trees in the vegetation of tiger reserve forest and sacred groove respectively. The variation in the conclusion is because of variation in study area.

A Lifeform of climber is a special feature of Jarandeshwar vegetation. 37 species belonging to 32 genera and 18 families have been reported. The percentage of climber in the total vegetation is 15.81%. Ganesh *et al.* reported 8.6 % climber while Sisodia reported 12.43% of climbers in the vegetation.

Taxonomic diversity of vegetation in Satara district studied by Chavan *et al.* (1973), Kanase (1991), Patil (1991), Deshpande *et al.* (1993), Bachulkar (1996), Mohite *et al.* (2007).

Chavan *et al.* reported 128 species of 54 families from Kas lake area of Satara. Flora was contributed by 108 dicots and 20 monocot plants. Kanase reported 640 species belonging to 470 genera and 120 families from Ajinkyatara fort of Satara District. Patil enumerated 525 species species and 357 genera belonging to 88 families in preliminary survey of Khatav taluka. The composition of the flora was Polypetalae (36.81%) Gamopetalae (30.84%) and apetalae (21.75%). Deshpande *et al.* worked on Mahabaleshwar flora. Study revealed 1398 species of flowering plants and 141 families.

Dicots and Monocots were represented by 1046 and 352 species respectively. Floristic diversity of Ajinkyatara fort was surveyed by Mohite *et al.* (2007). They reported 350 species belonging to 71 families. Of these 310 species are dicotyledons and 40 species are monocotyledons.

According to the present assessment of vegetation of Jarandeshwar hill, it is composed of 233 species, 183 genera and 66 families. Contribution of dicots and monocots species was 198 and 35 respectively. Jarandeshwar hill shows similarities with the work of Patil (1991). In the present work group contribution in descending order is Polypetalae (48.7%) Gamopetalae (30.47%) Apetalae (06.86%) and Monocots (14.60%). This sequence is similar to the previous floristic work of Khatav Taluka.

B. Ecological Studies of vegetation from Jarandeshwar hill.

A major impediment in documenting forest vegetation in the country has been lack of any quantitative information. Forest vegetation largely described on the basis of qualitative criteria such as physiognomy and the dominant species. Quantitative description of vegetation documenting the relative abundance and distribution of plant species are uncommon (Ramkrishnan, 2006). Biodiversity is the important resource for the living world. Increasing human population reduces the diversity of species worldwide. The stability, productivity and other aspects of managed and natural ecosystems are dependant on biodiversity. In addition to qualitative and quantitative criteria ecological criteria should also be included for describing forest vegetation.

a) Ecology of trees:

Table 12 represents ecological data of tree species from east side of Jarandeshwar hill. It shows following tree species: *Anogeissus latifolia, Boswellia serrata, Lannea coromandelica Maytenus senegalensis, and Terminalia elliptica* these species showed 100% frequency. This is followed by *Bridelia retusa* and *Tectona grandis* (83.3%) frequency. At west side of the Jarandeshwar hill *Anogeissus latifolia, Boswellia serrata, Dalbergia sissoo, Maytenus senegalensis and Terminalia elliptica* showed 100% frequency. At south side of the Jarandeshwar hill tree species with 100% frequency were *Anogeissus latifolia* and *Maytenus senegalensis.* It is followed by *Boswellia serrata Terminalia elliptica* and *Flacourtia indica* with 83.3% frequency. *Albizia amara, Anogeissus latifolia, Boswellia serrata, Cordia dichotoma Holarrhenna pubescens, Terminalia elliptica* and *Ziziphus caracutta showed* 100% frequency at north side of the hill

Table -12: Sidewise ecological data of Tree species at Jarandeshwar Hill.

Botanical Name	East			West			South			North		
	F	D	A	F	D	A	F	D	A	F	D	A
Anacardiaceae												
Buchanania cochinchinensis (Lour.) Almeida	0	0	0	66.6	4.66	7	0	0	0	0	0	0
*Lannea coromandelica (*Houtt.) Merr.	100	8.16	8.16	83.3	9.16	11	33.3	2.66	8	0	0	0
Apocynaceae												
Holarrhenna pubescens. Buch.-Ham.)Wall	0	0	0	0	0	0	33.3	0.5	1.5	100	1.5	1.5
Plumeria rubra L.	0	0	0	16.6	0.16	1	0	0	0	0	0	0
Wrightia tinctoria R.Br.	0	0	0	16.6	0.16	1	33.3	0.33	1	0	0	0
Bignoniaceae												
Dolichandrone falcata (Wall). Seem	0	0	0	16.6	0.5	3	0	0	0	50	4	8
Heterophragma quadriloculare (Roxb.) k. Schum.	16.6	0.33	2	33.3	1.83	5.5	0	0	0	0	0	0
Bombacaceae												
Bombax ceiba L.	16.6	0.16	1	33.3	0.83	2.5	50	0.66	1.33	0	0	0
Boraginaceae												
Cordia dichotoma Forst. f. dich	16.6	0.16	1	33.3	0.66	2	16.6	0.16	1	0	0	0
Burseraceae												
Boswellia serrata Roxb.	100	5.5	5.5	100	4	4	83.3	4.66	5.6	100	2	2
Caesalpiniaceae												
Bauhinia racemosa Lamk.	66.6	1.66	2.5	83.3	1.5	1.8	50	0.83	1.66	50	0.5	1
Cassia fistula L.	16.6	0.16	1	16.6	0.16	1	33.3	0.33	1	0	0	0
Cassia siamea Lamk.	0	0	0	16.6	0.33	2	0	0	0	0	0	0
Pongamia pinnata L.	0	0	0	0	0	0	16.6	0.5	3	0	0	0
Tamarindus indica L.	0	0	0	50	0.5	1	0	0	0	0	0	0
Celastraceae												
Maytenus senegalensis (Lam.) Excell.	100	11.1	11.1	100	3	3	100	12.3	12.3	50	4	8
Cassine glauca (Rottb.)O.Ktze.	83.3	1	1.2	66.6	2.83	4.25	33.3	1.66	5	50	0.5	1
Combretaceae												
Anogeissus latifolia (Roxb.)Wall	100	11	11	100	14	14	100	13.3	13.3	100	17.5	17.5
Terminalia bellirica (Gaertn) Roxb.	0	0	0	33.3	0.83	2.5	0	0	0	0	0	0
Terminalia chebula Retz.	16.6	0.16	1	0	0	0	16.6	0.16	1	0	0	0
Terminalia elliptica Will	100	4.16	4.16	100	6	6	83.3	15.3	18.4	100	20.5	20.5
Ebenaceae												
Diospyros melanoxylon Roxb.	50	3.16	6.33	66.6	2.33	3.5	66.6	3.5	5.25	0	0	0
Diospyros oocarpa Thw.	66.6	1.5	2.25	33.3	0.33	1	16.6	0.16	1	50	0.5	1
Euphorbiaceae												
Bridelia retusa L.	83.3	1	1.2	66.6	2.83	4.25	33.3	1.66	5	50	0.5	1
Emblica officinalis Gaertn.	0	0	0	33.3	1	3	66.6	2.16	3.25	50	0.5	1
Jatropha curcas L.	0	0	0	0	0	0	16.6	0.16	1	0	0	0
Fabaceae												
Butea monosperma Lamk.	0	0	0	33.3	1	3	16.6	0.5	3	0	0	0
Dalbergia latifolia Roxb.	16.6	0.33	2	83.3	2.66	3.2	0	0	0	0	0	0
Dalbergia sissoo Roxb.	16.6	0.16	1	100	2.83	2.83	16.6	0.33	2	0	0	0
Glyricidia sepium Jacq.	0	0	0	0	0	0	16.6	0.33	2	0	0	0
Ougeinia oojeinensis (Roxb.) Hochr.	16.6	1	6	0	0	0	0	0	0	50	1	2
Pterocarpous marsupium	0	0	0	0	0	0	33.3	0.33	1	0	0	0

Roxb.												
Sesbania sesban L.	0	0	0	0	0	0	16.6	0.33	2	0	0	0
Flacourtiaceae												
Casearia graveolens Dalz.	0	0	0	33.3	0.5	1.5	16.6	0	0	50	0.5	1
Flacourtia indica (Burm.f.) Merr.	66.6	1.16	1.75	83.3	2	2.4	83.3	2.33	2.8	0	0	0
Flindersiaceae												
Chloroxylon swietenia DC.	0	0	0	33.3	0.33	1	16.6	0.33	2	0	0	0
Lythraceae												
Lagerstroemia parviflora Roxb.	66.6	2.5	3.75	16.6	0.33	2	16.6	1	6	0	0	0
Meliaceae												
Azadirachta indica A. Juss.	16.6	0.16	1	50	1	2	33.3	1	3	50	2.5	5
Mimosaceae												
Acacia catechu (L.f.) Willd	0	0	0	50	1.16	2.33	0	0	0	0	0	0
Acacia chundra (Roxb.) Wild.	33.3	0.33	1	33.3	0.5	1.5	33.3	4.16	12.5	0	0	0
Acacia leucophloea Roxb.	33.3	1.5	4.5	33.3	0.66	2	0	0	0	0	0	0
Acacia nilotica L.	0	0	0	50	0.66	1.33	0	0	0	0	0	0
Albizia amara Roxb.	16.6	0.16	1	66.6	0.66	1	16.6	0.16	1	100	4	4
Albizia lebbek (L) Bth	0	0	0	16.6	0.33	2	16.6	0.83	5	0	0	0
Albizia procera (Roxb.) Bth	66.6	3.83	5.75	33.3	1.16	3.5	83.3	2	2.4	50	0.5	1
Leucaena latisiliqua (L.) Gillis	0	0	0	0	0	0	33.3	1.16	3.5	50	1	2
Moraceae												
Ficus amplissima J.E.Smith	0	0	0	16.6	0.16	1	0	0	0	0	0	0
Ficus benghalensis L.	0	0	0	0	0	0	16.6	0.16	1	0	0	0
Ficus racemosa L.	33.3	0.83	2.5	0	0	0	16.6	0.16	1	0	0	0
Ficus religiosa L.	50	3.16	6.33	33.3	0.5	1.5	33.3	0.66	2	0	0	0
Myrtaceae												
Syzigium cumini L.	0	0	0	0	0	0	16.6	0.16	1	0	0	0
Rhamnaceae.												
Ziziphus mauritiana Lamk.	33.3	0.33	1	0	0	0	16.6	0.5	3	0	0	0
Ziziphus caracutta Roxb.	16.6	0.5	3	33.3	0.33	1	16.6	0.16	1	100	2	2
Rubiaceae												
Meyna laxiflora Robyns.	16.6	0.16	1	66.6	1.66	2.5	33.3	0.33	1	0	0	0
Santalaceae												
Santalum album L.	16.6	0.16	1	0	0	0	0	0	0	0	0	0
Sterculiaceae												
Sterculia urens Roxb.	16.6	0.16	1	66.6	1.66	2.5	0	0	0	0	0	0
Tiliaceae												
Grewia tilifolia Vahl.	66.6	3.33	5	66.6	3.33	5	66.6	3.16	4.75	50	0.5	1
Verbinaceae												
Tectona grandis L.f.	83.3	12.1	14.6	83.3	5.16	6.2	16.6	1	6	0	0	0
Vitaceae												
Cissus woodrowii (Stef) Sant.	16.6	0.83	5	0	0	0	16.6	0.33	2	0	0	0

b) Ecology of shrub species:

Ecological studies of shrubs in the study area revealed following species as dominant: East side – *Ixora nigrican* (100%), *Clerodendrum serratum* (75%), *Grewia serrulata* (75%), *Carissa carandas* (66.6%) *and Grewia orbiculata* with (58.3%) frequency. West side – Tephrosia *purpurea* (75%), *Maytenus rothiana* (58.3%), *Ixora nigricans* (50%) and *Woodfordia fruticosa* with (41.6%) frequency. South side – *Carissa carandas, Maytenus rothiana, Clerodendrum serratum, Grewia orbiculata,*

Table -13: Sidewise ecological data of Shrub species at Jarandeshwar Hill.

Botanical Name	East			West			South			North		
	F	D	A	F	D	A	F	D	A	F	D	A
Acanthaceae												
Barleria gibsoni Dalz.	16.6	0.83	5	0	0	0.0	25	1.16	4.66	0	0	0.0
Anacardiaceae												
Rhus sinuata Thumb.	0	0	0.0	25	0.33	1.33	33.3	0.33	1	50	0.5	1
Apocynaceae												
Carissa carandas L.	66.6	1	1.5	0	0	0.0	66.6	0.66	1	0	0	0.0
Caesalpiniaceae												
Cassia auriculata L.	16.6	0.16	1	0.0	0.0	0.0	58.3	0.58	1	0	0	0.0
Cassia occidentalis L.	8.33	0.08	1	0	0	0.0	8.33	0.08	1	0	0	0.0
Cassia surattensis Burm.f.	00	00	00	0	0	0.0	16.6	0.25	1.5	0.0	0.0	0.0
Cassia tora L.	25	0.25	1	0	0	0.0	8.33	0.08	1	0	0	0.0
Cassia uniflora Mill	25	0.25	1	0	0	0.0	8.33	0.16	2	0	0	0.0
Capparaceae												
Capparis decidua (Forssk.) Edg.	8.33	0.08	1	16.6	0.33	2	0	0	0.0	0	0	0.0
Capparis rotundifolia Rottl.	8.33	0.08	1	0	0	0.0	16.6	0.16	1	0	0	0.0
Celastraceae												
Maytenus rothiana (Rottb.) O. Ktze	0	0	0.0	58.3	0.66	1.14	66.6	0.66	1	75	0.75	1
Fabaceae												
Butea superba Roxb.	8.33	0.08	1	25	0.25	1	0	0	0.0	0	0	0.0
Indigofera tinctoria L.	0	0	0.0	25	0.25	1	33.3	0.33	1	0	0	0.0
Tephrosia purpurea (L.) Pers.	8.33	0.08	1	75	1.25	1.66	41.6	0.41	1	0	0	0.0
Liliaceae												
Gloriosa superba L.	25	0.25	1	0	0	0.0	0	0	0.0	0	0	0.0
Lythraceae												
Lawsonia inermis L.	58.3	0.58	1	0	0	0.0	50	0.58	1.16	0	0	0.0
Woodfordia fruticosa (L.) Kurz.	0	0	0.0	41.6	0.41	1	58.3	0.58	1	75	0.75	1
Plumaginaceae												
Plumbago zeylanica L.	50	0.66	1.33	0	0	0.0	0	0	0.0	100	1	1
Rubiaceae												
Ixora nigricans R Br.	100	4.5	4.5	50	0.58	1.16	66.6	1.25	1.87	100	1.5	1.5
Spermadictyon sauveolens Roxb.	25	0.25	1	0	1.16	0.0	66.6	0.66	1	0	0	0.0
Solanaceae												
Datura metel L.	25	0.25	1	0	0	0.0	0	0	0.0	0	0	0.0
Thymelaeaeceae												
Gnidia glauca (Fresen.) Gilg.	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tiliaceae												
Grewia orbiculata Rott.	58.3	0.83	1.42	16.6	0.16	1	66.6	1.08	1.62	50	0.5	1
Grewia serrulata DC.	75	0.75	1	16.6	0.16	1	58.3	1.25	2.14	75	0.75	1
Verbenaceae												
Clerodendrum serratum (L.) Moon.	75	2.25	3	0	0	0.0	66.6	1	1.5	50	0.5	1
Lantana camara L.	0.0	0.0	0.0	0.0	0.0	0.0	25	1.16	4.66	0.0	0.0	0.0

Ixora nigricans, Spermadictyon sauviolen and showed 66.6% frequency. North side – *Ixora nigricans* and *Plumbago zeylanica* with 100% frequency, and *Maytenus rothian , Grewia orbiculata, Grewia serrulata* and *Woodfordia fruticosa* with 75% frequency (Table 13).

Table -14: Sidewise ecological data of Climber species at Jarandeshwar Hill.

Botanical Name	East			West			South			North		
	F	D	A	F	D	A	F	D	A	F	D	A
Asclepiadaceae												
Ceropegia hirsuta Wt. & Arn	16.6	0.16	1	16.6	0.16	1	8.33	0.08	1	0	0	0.0
Gymnema sylvestre (Retz.) R.Br.	16.6	0.25	1.5	16.6	0.16	1	0	0	0.0	25	0.25	1
Hemidesmus indicus (L.) Schult.	16.6	0.16	1	8.33	0.08	1	8.33	0.08	1	12.5	0.12	1
Leptadenia reticulata (Retz.) Wt &Arn.	16.6	0.16	1	0	0	0.0	33.3	0.33	1	12.5	0.12	1
Tylophora dalzellii Hook. f.	8.33	0.08	1	0	0.41	0.0	8.33	0.08	1	0	0	0.0
Wattakaka volubilis (L.f.) Stap f.	8.33	0.08	1	0	0.08	0.0	16.6	0.16	1	0	0	0.0
Capparaceae												
*Capparis grandiflora*Wt.	8.33	0.08	1	0	0	0.0	41.6	0.41	1	0	0	0.0
Celastraceae												
Celastrus paniculatus Willd.	16.6	0.16	1	0	0	0.0	16.6	0.41	2.5	0	0	0.0
Convolvulaceae												
Ipomoea indica (Burm.) f.	8.33	0.08	1	16.6	0.16	1	8.33	0.41	5	12.5	0.12	1
Ipomoea eriocarpa R.Br.	8.33	0.16	2	16.6	0.16	1	0	0	0.0	0	0	0.0
Cucurbitaceae												
Cucumis setosus L	0	0.08	0.0	0	0	0.0	16.6	0.16	1	0	0	0.0
Memordica dioica Roxb.	8.33	0.08	1	0	0	0.0	8.33	1.25	15	0	0	0.0
Dioscoriaceae												
Dioscoria pentaphylla L.	16.6	0.08	0.5	8.33	0.08	1	41.6	0.41	1	12.5	0.12	1
Fabaceae												
Abrus precatorius L.	41.6	0.41	1	16.6	0.16	1	0	0	0.0	0	0	0.0
Butea superba Roxb.	8.33	0.08	1	0	0	0.0	33.3	0.33	1	0	0	0.0
Cajanus scarabaeodes (L.) Du Petit-Thou	25	0.25	1	0	0	0.0	0	0.41	0.0	0	0	0.0
Clitoria ternatea L.	16.6	0	0	41.6	0.41	1	100	1	1	0	0	0.0
Teramnus labialis (L.f.) Spreng	16.6	0.16	1	0	0	0.0	41.6	0.41	1	25	0.62	2.5
Teramnus repens ssp. gracilis (Chiov.) Verdc.	16.6	0.16	1	0	0	0.0	8.33	0.08	1	0	0	0.0
Vigna aconitifolia (Jacq.) Morehal.	0	0	0.0	0	0	0.0	8.33	0.08	1	12.5	0.12	1
Vigna trilobata (L.) Verd.	0	0	0.0	0	0	0.0	8.33	0.08	1	0	0	0.0
Liliaceae												
Asparagus racemosus Willd.	58.3	0.58	1	8.33	0.08	1	16.6	0.33	2	0	0	0.0
Malphighiaceae												
Aspidopteris cordata (Heyne) A. Juss..	16.6	0.16	1	0	0	0.0	16.6	0.16	1	25	0.25	1
Menispermaceae												
Cardiospermum halicacabum L.	16.6	0.16	1	16.6	0.16	1	100	1	1	12.5	0.12	1
Cissampelos pareira L.	8.33	0.08	1	58.3	0.58	1	41.6	0.58	1.4	25	0.25	1
Cocculus hirsutus (L.) Theob	8.33	0.25	3	58.3	0.58	1	16.6	0.08	0.5	25	0.5	2
Cyclea peltata (Lamk.) Hook. F. Thoms.	8.33	0	0	0	0	0.0	0	0	0.0	0	0	0.0
Mimosaceae												
Mimosa pudica L.	8.33	0.08	1	0	0.16	0.0	41.6	0.41	1	0	0	0.0
Oleaceae												
Jasminum auriculatum Vahl.	8.33	0.08	1	0	0	0.0	41.6	0.41	1	12.5	0.12	1
Jasminum roxburgianum Wall.	16.6	0.16	1	16.6	0.16	1	58.3	0.08	0.14	0	0	0.0
Periplocaceae												
Cryptolepis buchanani R. Br. Roem & Schult.	8.33	0.08	1	8.33	0.08	1	16.6	0.16	1	12.5	0.12	1
Rananculaceae												
Clematis heynei M.A. Rau	8.33	0.08	1	8.33	0.08	1	16.6	0.58	3.5	12.5	0.12	1
Clematis gouriana Roxb	0	0	0.0	16.6	0.16	1	8.33	0.08	1	12.5	0.12	1
Rhamnaceae												
Ventilago denticulata Willd.	0	0	0.0	41.6	0.75	1.8	91.6	1	1.09	37.5	0.37	1
Ventilago maderaspatana Gaertn.	8.33	0.08	1	66.6	1	1.5	8.33	0.08	1	0	0	0.0
Smilacaceae												
Smilax zeylanica L.	8.33	0.08	1	16.6	0	0	0	0	0.0	25	0.25	1
Vitaceae												
Cissus repens Lamk.	16.6	0.16	1	41.6	1.16	2.8	0	0	0	12.5	0.12	1

Table -15: Sidewise ecological data of Herb species at Jarandeshwar Hill.

Botanical Name	East			West			South			North		
	F	D	A	F	D	A	F	D	A	F	D	A
Acanthaceae												
Rostellularia quinqueanguiaris (Koen.) Nees	54.1	0.87	1.61	0	0	0.00	0	0	0.00	87.5	2.12	2.42
Nilgirianthus heyneanus (Nees)	70.8	1.95	2.76	70.8	2	2.82	54.1	0.58	1.07	62.5	0.62	1
Blepharis maderaspatensis (L.) Roth	62.5	1	1.6	41.6	0.5	1.2	75	0.75	1	50	1.5	3
Andrographis paniculata (Burm. f.) Wall.	87.5	2	2.28	79.1	1.04	1.31	70.3	1.08	1.52	50	0.75	1.5
Rungia elegans Dalz.	50	2	4	87.5	1.16	1.33	58.3	1.37	2.35	25	0.25	1
Justicia latispica (Cl) Gamble	70.8	2.37	3.35	54.1	0.54	1	25	0.37	1.5	25	1	4
Pleocaulus ritchiei (Cl.) Bremek	0	0	0.00	12.5	0.25	2	20.8	0.20	1	25	0.25	1
Rungia repens (L.) Nees.	95.8	2.79	2.91	62.5	1.37	2.2	37.5	1.04	2.77	0	0	0.00
Eranthemum rosium (Vahl) R. Br.	12.5	0.12	1	4.16	0.04	1	0	0	0.00	0	0	0.00
Agavaceae												
Agave americana	54.1	1	1.84	0	0	0.00	4.16	0.04	1	0	0	0.00
Amaranthaceae												
Altrenthera sessilis (L.) R.Br.	62.5	2	3.2	95.8	1.04	1.08	50	0.5	1	25	0.5	2
Celosia argentea L.	4.16	1.04	25	0	0	0.00	0	0	0.00	0	0	0.00
Apiaceae												
Pinda concanese Dalz.	12.5	0.29	2.33	0	0	0.00	0	0	0.00	25	0.25	1
Pimpinella adscendens Dalz.	37.5	0.75	2	50	0.70	1.41	8.33	0.08	1	0	0	0.00
Pimpinella wallichiana (Miq.) Gandhi	8.33	0.08	1	0	0	0.00	0	0	0.00	0	0	0.00
Asteraceae												
Cosmos bipinnatus Cav.	8.33	1.12	13.5	33.3	0.54	1.62	20.8	0.20	1	75	0.85	1.16
Lagascea mollis Cav.	50	1.12	2.25	8.33	0.08	1	0	0	0.00	62.5	0.62	1
Echinops echinatus Roxb.	0	0	0.00	20.8	0.33	1.6	29.1	0.29	1	50	0.62	1.25
Pentanema indicum (L.) Wing	0	0	0.00	0	0	0.00	0	0	0.00	37.5	0.37	1
Synedrella nodiflora (L.) Gaertn.	62.5	1.37	2.2	79.1	1.04	1.31	33.3	1.12	3.37	25	2.12	8.5
Pulicaria wightiana (DC.) Cl.	0	0	0.00	0	0	0.00	87.5	1.16	1.33	0	0	0.00
Tridax latispica L.	54.1	1.54	2.84	0	0	0.00	75	0.75	1	0	0	0.00
Tricholepis radicans (Roxb.) DC.	75	0.70	0.94	62.5	0.62	1.00	50	0.79	1.58	0	0	0.00
Scenecio edgeworthii Hook.f.	37.5	0.75	2	20.8	0.20	1	33.3	0.37	1.12	0	0	0.00
Blainvillea acmella (L) Philipson.	12.5	0.20	1.66	50	0.62	1.25	8.33	0.08	1	0	0	0.00
Cyathocline purpurea (Buch-Ham) O. Ktze.	0	0	0.00	0	0	0.00	8.33	0.08	1	0	0	0.00
Ageratum conyzoides L.	83.3	1.45	1.75	41.1	1.38	3.35	79.1	1.41	1.78	25	0.62	2.5
Acanthospermum hispidum DC.	8.33	0.25	3	0	0	0.00	8.33	0.08	1	12.5	0.12	1
Blumea malcolmii (Cl.) Hook.f.	75	3.62	4.83	29.1	0.54	1.85	91.6	1.04	1.13	0	0	0.00
Balsaminaceae												
Impetiens balsamina L.	20.8	0.70	3.4	29.1	0.29	1	12.5	1	8	0	0	0.00
Boraginaceae												
Trichodesma zeylanicum (Burm. F.) R. Br.	70.8	1.04	1.47	83.3	2.12	2.55	12.5	0.12	1	75	0.87	1.16
Caesalpiniaceae												
Cassia absus L.	8.33	0.08	1	0	0	0.00	4.16	0.04	1	0	0	0.00
Cassia mimosoides L.	16.6	0.37	2.25	8.33	0.08	1	0	0	0.00	0	0	0.00
Campanulaceae												
Wahlenbergia marginata (Thunb.) DC.	20.8	0.91	4.4	0	0	0.00	0	0	0.00	37.5	0.75	2
Commelinaceae												
Cyanotis tuberose J.A.& J.H.Schult	8.33	0.29	3.5	0	0	0.00	12.5	0.12	1	0	0	0.00
Convolvulaceae												
Convolvulus rottlerianus Chofy.	50	2	4	20.8	0.20	1	79.1	1.95	2.47	25	1.75	7
Evolvulus alsinoides (L.)L	50	1.95	3.91	50	0.79	1.58	8.33	0.20	2.5	0	0	0.00
Crassuliaceae												
Kalanchoe bhidei Cooke.	0	0	0.00	0	0	0.00	16.6	0.62	3.75	0	0	0.00
Cyperaceae												
Cyperus compressus L.	16.6	0.70	4.25	0	0	0.00	12.5	0.62	5	0	0	0.00
Pycreus flavidus var. flavidus (Retz.) T. Koyama	0	0	0.00	0	0	0.00	12.5	0.58	4.66	0	0	0.00

Cyperus diformis L.	16.6	0.5	3	0	0	0.00	8.33	0.33	4	0	0	0.00
Fimbristylis microcarya Muell.	16.6	0.70	4.25	4.16	0.29	7	4.16	0.20	5	0	0	0.00
Cyperus iria L.	16.6	0.16	1	0	0	0.00	0	0	0.00	0	0	0.00
Eriocaulaceae												
Eriocaulon conicum (Fyson) Fischer	4.16	0.16	4	0	0	0.00	0	0	0.00	0	0	0.00
Euphorbiaceae												
Euphorbia geniculata Orteg.	20.8	0.29	1.4	0	0	0.00	20.8	0.20	1	75	1	1.33
Euphorbia hirta L.	20.8	0.91	4.4	0	0	0.00	0	0	0.00	37.5	0.75	2
Phylanthus amarus Schumach & Thonn	37.5	0.37	1	0	0	0.00	0	0	0.00	0	0	0.00
Fabaceae												
Alysicarpus longifolius (Rottl.) Whight & Arn.	87.5	1.29	1.47	50	1	2	62.5	0.62	1	75	1.5	2
Pseudarthria viscida (L.) Wt. & Arn.	0	0	0.00	37.5	0.75	2	16.67	0.33	2	75	1.25	1.66
Crotalaria orixensis Willd.	58.3	3.54	6.07	0	0	0.00	66.6	1.33	2	37.5	0.37	1
Crotalaria medicaginea var. neglecta Lam.	66.6	2.66	4	20.8	0.5	2.4	0	0	0.00	37.5	0.62	1.66
Indigofera cordifolia Heyne	50	1.41	2.83	0	0	0.00	83.3	1.37	1.65	25	0.5	2
Echinocloa colona Link.	50	1.12	2.25	0	0	0.00	54.1	0.91	1.69	0	0	0.00
Alysicarpus pubescens var. pubescens	75	1.5	2	37.5	1.33	3.55	50	0.5	1	0	0	0.00
Alysicarpus tetragonolobus Edgew.	75	1.41	1.88	45.8	1	2.18	41.6	0.41	1	0	0	0.00
Desmodium heterocarpon (L.) DC	12.5	0.29	2.33	8.33	0.08	1	20.8	0.20	1	0	0	0.00
Indigofera linifolia (L.f.) Retz.	83.3	1.16	1.4	0	0	0.00	12.5	0.04	0.33	0	0	0.00
Desmodium velutinum (Willd.) DC.	4.16	0.16	4	0	0	0.00	12.5	0.33	2.66	0	0	0.00
Desmodium scorpiurus (Sw.) Desv.	8.33	0.20	2.5	8.33	0.08	1	8.33	0.08	1	0	0	0.00
Cajanus crassus (Prain & King) Van der Maesen.	29.1	0.29	1	0	0	0.00	8.33	0.20	2.5	0	0	0.00
Neonotonia wightii (Wight & Arn.) Lackey	12.5	0.12	1	75	0.75	1	0	0	0.00	0	0	0.00
Zornia gibbosa Span.	12.5	0.29	2.33	45.8	0.62	1.36	0.00	0.00	0.00	0.00	0.00	0.00
Crotalaria hebecarpa (DC.) Rudd.	62.5	1.58	2.53	41.6	0.62	1.5	0	0	0.00	0	0	0.00
Dipteracanthus patulus (Jacq.) Nees	0	0	0.00	4.16	0.04	1	0	0	0.00	0	0	0.00
Gentianaceae												
Exacum lawii C.B. Cl.	0	0	0.00	0	0	0.00	16.6	0.95	5.75	0	0	0.00
Hypoxidaceae												
Curculigo orchioides Gaertn	8.33	0.08	1	0	0	0.00	12.5	0.12	1	0	0	0.00
Lamiaceae												
Lavandula bipinnata (Roth.) O. Ktze.	12.5	0.20	1.66	8.33	0.08	1	0	0	0.00	37.5	0.37	1
Lepidagathis trinervis Nees	25	0.25	1	8.33	0.25	3	0	0	0.00	12.5	0.12	1
Ocimum americanum L.	20.8	0.25	1.2	8.33	0.20	2.5	8.33	0.08	1	0	0	0.00
Liliaceae												
Chlorophytum glaucum Dalz.	4.16	0.12	3	12.5	0.12	1	16.6	0.62	3.75	25	0.25	1
Linaceae												
Linum mysurense Heyne	70.8	1.75	2.47	0	0	0.00	50	1.04	2.08	0	0	0.00
Lobeliaceae												
Lobelia alsinoides Lam.	29.1	0.29	1	0	0	0.00	58.3	2	3.42	62.5	0.62	1
Lythraceae												
Ammania buccifera L.	29.1	1	3.42	29.1	0.70	2.42	25	1.04	4.16	0	0	0.00
Malvaceae												
Pavonia zeylanica (L.) Cav	0	0	0.00	0	0	0.00	45.8	0.87	1.90	75	0.75	1
Malvastrum coromandelianum (L.) Garcke	0	0	0.00	0	0	0.00	75	1.29	1.72	0	0	0.00
Sida mysurensis Wt & Arn.	12.5	0.33	2.66	50	0.62	1.25	62.5	0.62	1	0	0	0.00
Abitulon indicum (L.)	41.6	0.54	1.3	0	0	0.00	50	0.62	1.25	0	0	0.00
Abelmoscus manihot (L.) Medik.	12.5	0.12	1	0	0	0.00	20.8	0.20	1	0	0	0.00
Nyctaginaceae												
Boerhavia repens L. var. diffusa Moorthy	58.3	2.62	4.5	20.8	0.29	1.4	16.6	0.70	4.25	0	0	0.00
Oxalidaceae												
Biophytum helenae Busc. Muschl.	37.5	0.58	1.55	0	0	0.00	33.3	0.33	1	0	0	0.00
Oxalis corniculata L.	0.00	0.00	0.00	0.00	0.00	0.00	12.5	0.70	5.66	0	0	0.00

Papavaraceae												
Argemone mexicana L.	12.5	0.12	1	8.33	0.08	1	12.5	0.12	1	0	0	0.00
Pedaliaceae												
Sesamum orientale L.	4.16	0.16	4	8.33	0.20	2.5	0	0	0.00	25	0.25	1
Poaceae												
Sporobolus indicus (L.) R. Br.	8.33	0.62	7.5	20.8	0.75	3.6	20.8	0.20	1	75	1	1.33
Themeda quadrivalvis	45.8	2.29	5	20.8	0.29	1.4	20.8	1.75	8.4	37.5	1	2.66
Aristida funiculata Trin. & Rupr.	62.5	3.83	6.13	29.1	0.58	2	75	3.5	4.66	87.5	3.12	3.57
Andropogon pumilus Roxb.	54.1	2.29	4.23	33.3	1.83	5.5	50	2	4	87.5	3.37	3.85
Apluda mutica L.	91.6	5.33	5.81	87.5	2.66	3.04	54.1	2.79	5.15	75	2.75	3.66
Heteropogon contartus R. & S.	83.3	3	3.6	50	1.16	2.33	50	1.95	3.91	75	3.12	4.16
Chloris virgata Swartz.	58.3	4.5	7.71	87.5	3	3.42	50	0.62	1.25	62.5	1.5	2.4
Sehima ischemoides Forssk.	20.8	2.37	11.4	87.5	5.16	5.90	50	1.54	3.08	62.5	0.62	1
Theleopogon elegans R.& S.	54.1	2.66	4.92	79.1	1.33	1.68	50	0.5	1	37.5	0.37	1
Chrysopogon polyphyllus Blatt. & Mc C.	45.8	2.29	5	41.6	0.41	1	0	0	0.00	37.5	1.87	5
Chionachnae koenigii (Spr.) THw.	70.8	3.87	5.47	0	0	0.00	0	0	0.00	37.5	3.5	9.33
Arthraxon hispidus Maklno var. hispidus	66.6	2.37	3.56	0	0	0.00	29.1	1.04	3.57	0	0	0.00
Arundinella tuberculata Lisboa	37.5	1.5	4	0	0	0.00	12.5	1.12	9	0	0	0.00
Melanochenchrus jaquemontii Jaub. & Spach	20.8	0.20	1	0	0	0.00	8.33	0.20	2.5	0	0	0.00
Dactyloctenium aegyptium willd.	8.33	0.62	7.5	45.8	0.75	1.63	0	0	0.00	0	0	0.00
Arthraxon lanceolatus Hochst. Var. lanciolatus	79.1	3.5	4.42	0	0	0.00	0	0	0.00	0	0	0.00
Aristida redacta Stapf.	50	1.41	2.83	0	0	0.00	0	0	0.00	0	0	0.00
Iseilema prostratum (L.) Andress	33.3	1.04	3.12	0	0	0.00	0	0	0.00	0	0	0.00
Lophopogon tridentatus Hack.	16.6	1.04	6.25	0	0	0.00	0	0	0.00	0	0	0.00
Tripogon bromoides R. & S.	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
Polygalaceae												
Polygala persicariifolia DC	0	0	0.00	37.5	0.37	1	50	1.12	2.25	0	0	0.00
Rananculaceae												
Delphinium mulabaricum Huth.	79.1	0.5	0.63	0	0	0.00	79.1	1.12	1.42	37.5	1.5	4
Rubiaceae												
Spermacoce pusilla Wall.	16.6	0.29	1.75	0	0	0.00	41.6	0.41	1	25	0.25	1
Santalaceae												
Osyris quadripartita Salz.	0	0	0.00	20.8	0.75	3.6	8.33	0.08	1	0	0	0.00
Scrophulariaceae												
Striga gesnerioides (Willd.) Vatke	0	0	0.00	8.33	0.08	1	41.6	0.83	2	50	1.87	3.75
Buchnera hispida Buch-Ham.	33.3	0.54	1.62	8.33	0.20	2.5	33.3	0.33	1	25	0.25	1
Sopubia delphinifolia (L.) G. Don.	62.5	1.16	1.86	0	0	0.00	70.8	0.70	1	0	0	0.00
Solanaceae												
Solanum nigrum L.	0	0	0.00	0	0	0.00	12.5	0.33	2.66	0	0	0.00
Tiliaceae												
Corchorus deccanensis H.B. Singh and Vishwanathan	33.3	0.62	1.87	4.16	0.04	1	29.1	0.29	1	50	1.5	3

c) Ecology of climbers:

Table 14 shows Frequency studies of climbers from study area. Climbers showed wide range of frequency between 8.33% to 100%. These are seasonal in occurrence. Sidewise dominant climbers in descending order of frequency were – East side – *Asparagus racemosus* (58.3%), *Abrus precatorius* (41.6%) and *Cajanus scarabaeodes* (25%). West side – *Ventilago maderaspatana (66.6), Cocculus hirsutus* and *Cissampelos pareira* are with 58.3% frequency. *Clitoria ternatea, Cissus repens* and *Ventilago denticualata* with 41.6% frequency. South side – *Clitoria ternatea* and *Cardiospermum halicacabum* showed 100% frequency, *Ventilago denticualata* showed

91.6% frequency. North side – *Ventilago denticualata* 37.5% *Teramnus labialis, Cissampelos pareira* and *Cardiospermum halicacabum* showed 25% frequency.

d) Ecology of herbs:

The contribution of herbs in the vegetation of Jarandeshwar hill was 48.2%. Surprisingly none of the herb shows 100% frequency. From the study area frequency range in case of herbs was 4.16% to 95.8%. Herbs with maximum frequency were *Rungia repens* (95.8%) *Apluda mutica* (91.6%), *Alysicarpus longifolius* (87.55%) *Heteropogon contartus* (83.3%) at east side of the hill. *Altrenthera sessilis* (95.8%) *Apluda mutica, Chloris virgata* and *Sehima ischemoides* shows 87.5% frequency at west side of the hill. South side was dominated by *Blumea malcolmi* (91.6%), *Pulicaria wightiana* (87.5%), *Indigofera cordifolia* (83.3%) *Ageratum conyzoides, Convolvulus rottlerianus and Delphinium mulabaricum* with 79.1% frequency. While north side of the hill showed following herbs. *Andropogon pumilus, Aristida funiculata, and Rostellularia quinqueangularis* with 87.5% frequency. *Alysicarpus longifolius Apluda mutica* and *Heteropogon contartus* with 75% frequency (Table 15).

Discussion

Ecological parameters of forest plants were studied by workers like Khan (1994), Ganesh *et al.* (1996), Kaduval and Parthsarthy (1999), Pandey and Singh (1999), Seetharam *et al.* (1999), Varma *et al.* (2001), Tripathi *et al.* (2002), Jayanarayanan and Menon (2002), Venkateswaram and Parthsarthi (2003), Ashiskumar (2006), Kaduval (2006), Salvi (2006) and Sisodia (2007).

Khan concluded that Gir forest showed dominant tree species like, *Acacia nilotica, Xeromphis spinosa, Terminalia crenulata* and *Boswellia serrata.* Pandey and Singh reported, the dominant tree species such as *Acacia chundra, Acacia leucophloea, Acacia senegal, Albizia odoratissima, Cassia fistula, Dalbergia lanciolaria* from Kumbhalgarh Wildlife Sanctury of Rajasthan. Tripathi *et al.* studied status of plant biodiversity in Mawlong syiem sacred groove of Meghalaya. He reported plant species like *Randia longiflora, Quercus dealbata, Schima wallichi, Gaultheria fragrantissima, Zanthoxylum armatum, Garcinia paniculata* as a dominant. Venkateswaram and N. Parthsarthy reported coastal species from Tropical dry evergreen forests on the coromandel coast of India like, *Memecylon umbelatum, Tricalysia spherocarpa, Pterospermum canescens, Diospermum ebenum, Drypetes sepiapiaria* as a dominant. Ashishkumar worked on Tropical forest of Garo hills. He reported dominant species as *Shorea robusta, Schima wallichi* and *Castanopsis purpurella.* Ganesh *et al.* studied

evergreen forest from Kalakad Mundanthurai Tiger reserve of Western Ghat. He described 50 shrubs while Pandey and Singh Reported 40 shrubs from Kumbhalgarh Wildlife Sanctury. *Niligirianthus, foliosus, Agrostistachis indica and Diotacanthus grandis* are dominant from tropical forest. Sisodia reported shrubs like *Sesbania bispinosa, Barleria cuspidata, Lantana camara, Capparis sepiaria* from Gir National park and Sanctury. Pandey and Singh reported– *Abrus precatorius, Ampelocissus latifolia, Asparagus racemosus, Cissampelos pareira, Cocculus hirsutus* and *Gloriosa superba* from Kumbalgarh Wildlife Sanctury, Rajasthan as common climbers. Khan worked on Gir forest and reported *Evolvulus nummularis, Leucascephalotes, Impatiens balsamina, Pavonia zeylanica, Crotalaria medicagina, Cassia tora* and *Desmodium rapendum* as the major herbs. Verma *et al.* analysed herbaceous vegetation. He reported 86 herbs. Common herbs were *Oplismensus burmannii, Sida acuta, Evolvulus nummularis, Desmodium triflorum, Rungia pectinata, Sida corda* and *Hyptis suaveolens.* Tripathi *et al.* worked out 24 herbs from Syiem Sacred grooves of Meghalaya. The dominant species were *Cyperus rotundus, Jasminum amplexicaule* and *Asplenium species* from Syiem sacred groove of Meghalaya.

Present work shows that vegetation at Jarandeshwar hill was composed of 59 tree species, 26 shrubs, 37 climbers and 112 herbs. The Dominanat trees were *Anogeissus latifolia, Maytenus senegalensis, Terminalia elliptica, Tectona grandis, Lannea coromandelica* and *Boswellia serrata.* Dominant shrubs were *Carissa carandas, Grewia serrulata* and *Ixora nigricans* Dominant climbers were *Asparagus racemosus, Clitoria ternatea, Ventilago denticulata* and *Cardiospermum halicacabum.* Dominant herbs are *Altrenthera sessilis, Convolvulus rottlerianus and Delphinium mulabaricum, Ageratum conyzoides* and *Blumea malcolmi.* These results appear closer to the work of Khan and Verma *et al.* Similarity in the results lies with species of climbers and herbs.

e) Ecological Indices:

Species richness was 3.6 on south side of the hill and 3.0, 3.1 and 3.5 at east, west and north side of the hill respectively. Eleven species were common to all four sides of the hill. The diversity indices were varied considerable among the four sides of the hill. South side showed maximum 1.98 and north side showed minimum 1.72 Shannon index. Mac intosh index of diversity is 1.018 to 1.04. It also indicated maximum and minimum diversity at south and north side of the hill respectively. Alpha diversity analysis of tree vegetation in descending order was 43.2, 38.6, 33.7 and 28.3 at south, east, west and north side respectively. Simpson diversity index gave following

value of diversity. East - 65.4, west – 48, south – 68.4 and north 38.9. Margaleff index value is in between 63.02 to 79.9. It shows maximum value at north side and minimum value at east side. Berger-Parker Dominance values were 3.98, 7.22, 4.23 and 7.02 respectively for east, west, south and north sides of the hill. Mackintosh evenness index of the tree species was 1.07 for all sides of the hill. All these values are reported sidewise in the table 16.

Table -16: Consulidated details of species inventory at four sides of the hill.

Parameter	East	West	South	North
Family	59	54	65	45
Genus	137	113	140	80
Species	174	134	174	91
Species richness	3.00	3.1	3.6	3.5
Shannon H' Log Base 10.	1.95	1.86	2.00	1.72
Margaleff M Base 10.	71.93	68.3	66.2	79.9
Berger-Parker Dominance (d%)	3.98	7.22	4.23	7.02
Species Diversity (D)	1.018	1.03	1.02	1.04
Alpha diversity	38.59	33.7	43.2	28.3
Simpsons Diversity (1/D)	65.48	48	68.4	38.9
Species Eveness (J)	0.87	0.87	0.87	0.87

An ecological study by using statistical methods is a new concept. It provides direct values regarding species richness, evenness and diversity of species. This type of work in recent years was done by Seetharam *et al.* (1999), Venkateswaram and Parthsarathy (2003) and Kaduval (2006).

Seetharam *et al.* worked out diversity of dry deciduous forest of Sandur. According to studies various ecological indices were Shannon- 1.73, Simpson 0.749 and Margaleff index - 24.75. Venkateswaram and Parthasarthy gave ecological indices of tree vegetation from coastal evergreen forest. The indices were Shannon (1.82-2.33), and Simpson (0.16-0.22). According to Kaduval, Kalarayan hill showed ecological indices as species richness (42-47), Shannon (2.305-2.869) and Simpson (0.99-0.192).

f) Important Value Index:

The table 17 shows the IVI data of tree species from Jarandeshwar hill. With reference to IVI value the dominant tree species were - *Anogeissus latifolia* (16.41), *Maytenus senegalensis* (9.986), *Terminalia elliptica* (9.738), *Tectona grandis* (9.367), *Lannea coromandelica* (7.945) and *Boswellia serrata* (5.532). Twenty species in the study area gave IVI value less than one while forty nine species gave IVI value above one.

Table -17: Important value index of tree species of Jarandeshwar hill.

Sr. No.	Botanical name	RF	RD	RDo	IVI
1	*Anogeissus latifolia* D.C.	0.027	16.357	0.032	16.41
2	*Maytenus senegalensis* (Lam.) Excell.	0.027	9.938	0.019	9.986
3	*Terminalia elliptica* Will	0.027	9.691	0.019	9.738
4	*Tectona grandis* L.f.	0.027	9.320	0.018	9.367
5	*Lannea coromandelica* (Houtt.)Merr.	0.027	7.901	0.015	7.945
6	*Boswellia serrata* Roxb.	0.027	5.493	0.011	5.532
7	*Diospyros melanoxylon* Roxb.	0.027	3.827	0.007	3.862
8	*Grewia tilifolia* Vahl.	0.027	3.827	0.007	3.862
9	*Albizia procera* (Roxb.)	0.027	2.654	0.005	2.687
10	*Bridelia retusa* L.	0.027	2.098	0.004	2.130
11	*Flacourtia indica* Grah.	0.027	2.098	0.004	2.130
12	*Acacia leucophloea* Roxb.	0.020	1.851	0.003	1.876
13	*Buchanania cochinchinensis* Lour	0.006	1.728	0.003	1.738
14	*Ficus religiosa* L.	0.020	1.604	0.003	1.629
15	*Bauhinia racemosa* Lamk.	0.027	1.543	0.003	1.574
16	*Lagerstroemia parviflora* Roxb.	0.027	1.543	0.003	1.574
17	*Dalbergia sissoo* Roxb.	0.027	1.296	0.002	1.326
18	*Emblica officinalis* Gaertn.	0.013	1.172	0.002	1.189
19	*Azadirachta indica* A. Juss.	0.027	1.111	0.002	1.141
20	*Dalbergia latifolia* Roxb.	0.013	1.111	0.002	1.127
21	*Albizia amara Roxb.*	0.027	0.864	0.001	0.893
22	*Diospyros oocarpa* Thw.	0.027	0.802	0.001	0.832
23	*Meyna laxiflora* Robyns.	0.020	0.802	0.001	0.825
24	*Acacia nilotica* L.	0.013	0.802	0.001	0.818
25	*Heterophragma quadriloculare* Roxb.	0.013	0.802	0.001	0.818

26	*Sterculia urens* Roxb.	0.013	0.679	0.001	0.694
27	*Bombax ceiba* L.	0.020	0.617	0.001	0.639
28	*Butea monosperma* Lamk.	0.013	0.555	0.001	0.570
29	*Albizia lebbek* (L)	0.013	0.432	0.001	0.446
30	*Acacia catechu* (L.F.) Willd	0.006	0.432	0.0009	0.439
31	*Leucaena latisiliqua* L. (Gillis)	0.006	0.4327	0.0009	0.439
32	*Cordia dichotoma* Forst.	0.020	0.3707	0.0009	0.392
33	*Ziziphus caracutta* Roxb.	0.020	0.3707	0.0008	0.392
34	*Ficus racemosa* L.	0.013	0.370	0.0007	0.385
35	*Ougeinia oojeinensis* Roxb.	0.006	0.370	0.0007	0.378
36	*Ziziphus mauritiana* Lamk.	0.013	0.308	0.0007	0.323
37	*Terminalia bellirica* Heyme.	0.006	0.308	0.0006	0.316
38	*Cassia fistula* L.	0.020	0.246	0.0005	0.268
39	*Cassine glauca* (Rottb.) O. Ktze.	0.013	0.246	0.0005	0.261
40	*Chloroxylon swietenia* DC.	0.013	0.246	0.0005	0.261
41	*Acacia chundra* Roxb	0.006	0.246	0.0005	0.254
42	*Wrightia tinctoria* R.Br.	0.013	0.185	0.0004	0.199
43	*Casearia graveolens* Dalz.	0.006	0.185	0.0004	0.192
44	*Dolichandrone falcata* (Wall). Seem	0.006	0.185	0.0004	0.192
45	*Holarrhenna pubescens*. Buch.-Ham.)Wall	0.006	0.185	0.0004	0.192
46	*Pongamia pinnata* L.	0.006	0.185	0.0004	0.192
47	*Tamarindus indica* L.	0.006	0.185	0.0004	0.192
48	*Terminalia chebula* Retz.	0.013	0.123	0.0003	0.137
49	*Cassia siamea* Lamk.	0.006	0.123	0.0003	0.130
50	*Glyricidia sepium* Jacq.	0.006	0.123	0.0003	0.130
51	*Pterocarpous marsupium* Roxb.	0.006	0.123	0.00024	0.130
52	*Sesbania sesban L.*	0.006	0.123	0.0003	0.130
53	*Ficus amplissima* J.E.Smith	0.006	0.061	0.0002	0.068
54	*Ficus benghalensis* L.	0.006	0.061	0.0002	0.068
55	*Jatropha curcas* L.	0.006	0.061	0.0001	0.068
56	*Plumeria rubra* L.	0.006	0.061	0.0001	0.068
57	*Santalum album* L.	0.006	0.061	0.0001	0.068
58	*Syzigium cumini* L.	0.006	0.061	0.0001	0.068
59	*Cissus woodrowii* L.	0.006	0.061	0.0001	0.068

Salvi (2006) Jayanarayanan ranked out the tree species from marine national park and Sanctuary. Menon (2002) studied Moist deciduous forest of Kerala respectively. According to the Salvi, *Prosopis chinensis* ranked first with 70.53 IVI. It is followed by *Euphorbia nivulia* (48.38), *Grewia ternex* (27.72) *Capparis deciduas* (21.76). In the work of Jayanarayanan and Menon *Vitex altisissima* (45.06), ranked first followed by *Xylea xylocarpa* (33.46). IVI of tree ranges between 4.21-45.06.

In the present work IVI ranking was *Anogeissus latifolia* (16.41), *Maytenus seenegalensis* (9.98), *Terminalia elliptica* (9.73), *Tectona grandis* (9.36) and *Lannea coromandelica* (7.94).

IVI studies of Marine National Park and Sanctuary shows primary type of forest, while moist deciduous forest of Kerala shows mixture of primary and secondary forest. Jarandeshwar hill forest is of secondary type due to low IVI results.

III. Ethnobotanical studies:

Plants of Jarandeshwar hill were studied from the view point of ethnobotany. Seven ethnobotanical aspects were observed. They are as follows: a) Edible plants b) Medicinal plants c) Fodder Plants d) Timber yielding plants e) Plants of religious value f) Gum resin and g) dye yielding plants.

a) Edible plants

Table 18 shows ten plant species reported in the present work as wild edible plants. They are used as leaf vegetable eg. *Cassia tora, Clerodendrum serratum* and *Tamarindus indica;* Making pickles e.g. *Diospyros melanoxylon, Emblica offiicinalis* and *Tamarindus indica;* and edible fruits are supplied by species like *Carissa carandas, Cucumis setosus, Diospyros melanoxylon, Emblica offiicinalis, Syzygium cumini Ziziphus mauritiana* and *Ziziphus oenoplia.* Young seeds of *Cassia tora* on rosting used in making soft drink like coffee.

Table 18: Wild edible plants from Jarandeshwar hill.

Name of the species	Family	Local Name	Part used	uses
Cassia tora L.	Caesalpiniaceae	Tarota	leaves	Fresh leaves are used as green vegetable and seeds for making drinks like coffee.
Tamarindus indica L.	Caesalpiniaceae	Chinch	fruits leaves	Young fruits are cooked to make curry. Mature fruits are made into pickles. Young leaves are also used as green
Clerodendrum serratum (L.) Moon.	Verbenaceae	Bharangi.	Leaves	Young leaves are used for stomache
Emblica offiicinalis L.	Euphorbiaceae	Awla	Fruits	Fruits are used to make pickles. Ripe fruits are eaten. .
Diospyros melanoxylon Roxb.	Ebenaceae	Tendu.	Fruits	Green fruits are used to make pickles. Ripe fruits are eaten.
Syzygium cumini (L.) Skeels	Myrtaceae	Jambhul	fruits	Ripe fruits are edible.
Ziziphus mauritiana Lamarck	Rhamnaceae	Bhor	Fruits	Fruits are edible
Ziziphus oenoplia (L.)	Rhamnaceae	Aroni.		Ripe fruits are edible.
Carissa carandas L.	Apocynaceae	Karvand	Fruit	Ripe fruits are edible
Cucumis setosus	Cucurbitaceae	Ran valuk	Fruit	Ripe fruits are edible

b) Plants used as medicine: (Plate -2)

Table 19 shows 34 plants from study area which are reported as medicinaly valuable. These are used by the natives for curing common diseases of stomache, skin, pains, wounds, bone fracture, mouth ulcers, body weakness etc. The analysis of the plants on the basis of part used showed seven classes viz. Whole plant (5), Root (9), Bark (3), leaves (10), flower (1), Fruit (2) and Seed (5).

Table -19: Medicinal plants from Jarandeshwar Hill.

Botanical Name	Family	Local Name	Part used	Use
Holarrhena pubescens (Buch-Ham.) Wallich	Apocynaceae	*Pandra kuda.*	Bark	The bark is used in the treatment of dysentery and amoebic dysentery.
Cassia fistula L.	Caesalpiniaceae	Bahava	Bark	Bark is used in skin diseases
Butea monosperma Lamk.	Fabaceae	Palas	Flowers	Flowers used in leprosy
Terminalia chebula (Gaertn.) Retzius	Combretaceae	*Hirda.*	Fruit	Fruit is used to cure cough and throat infections
Emblica officinalis L.	Euphorbiaceae	*Awala.*	Fruits	Fruits are applied to head to prevent dandruff. Fruit juice is also used as general tonic in common weakness
Andrographis paniculllta (Burm.f.) Wall.	Acanthaceae	*Bhui neem.*	Leaves	Leaves are used as antidote for snake bite
Achyranlhes aspera L.	Amaranthaceae	*Akhada*	Leaves	Juice of the leaves given to cure diarrhea. The roasted seeds used in skin diseases
Celosia argentea L.	Amaranthaceae	*Kurdu*	Leaves	Leaves are used for fever

Gymnema sylvestre (Retz.) R.Br. & S.	Asclepiadaceae	Bedaki	Leaves	Fresh leaves are useful to cure diabetics
Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	*Behada.*	Leaves	Juice of leaves is used for earache
Azadirachta indica A. Juss.	Meliaceae	*Kadu Neem.*	Leaves	Leaves are used to cure viral diseases like small pox and chicken pox and skin diseases
Mimosa pudica L.	Mimosaceae	Lajalu	Leaves	Leaf and stem in scorpion sting.
Ziziphus mauritiana Lamk.	Rhamnaceae.	Ghotbor	Leaves	Leaves are bitter cooling, antipyretic, laxative, for chest pain, pregnancy pain
Lantana camara L.	Verbenaceae	*Ghaneri*	Leaves	Leaf extract taten orally to cure diarrhoea
Clerodendrum serratum (L.) Moon.	Verbenaceae	*Bharangi.*	Leaves	Young leaves are used for stomache
Gloriosa superba L.	Liliaceae	Kal lavi	Root	It cures Leprosy, Ulcer, stomache
Argemone mexicana L.	Papavaraceae	Piwala Dhotara	Root	Root used in skin disease
Plumbago zeylanica L.	Plumaginaceae	Chitrak	Root	Root externally applied for leprosy and other skin disease.
Hemidesmus indicus (L.) R.Br.	Asclepiadaceae	Anantmul	Roots	Roots are used for mouth ulcer.
Tylophora daizellii Hook. f.	Asclepiadaceae		Roots	Powder of root is given in dysentery.
Asparagus racemosus Will.	Liliaceae	*Shatawari.*	Roots	Tuberous roots are used as an appetizer
Ficus benghalensis L	Moraceae	Vad	Roots	Skin diseases, eye troubles, mouth sores, fever, madness, atrophy, cholera, burning sensations and vaginal disorders, toothache disorders. Seeds are cooling
Ficus racemosa L.	Moraceae	Umber	Roots and leaves	Useful for curing dysentery and muscular pain
Abrus precatorius L.	Fabaceae	*Gunja*	Seed	Seed crushed into powder and taken to cure pneumonia and other bronchial diseases.
Sesamum orientale Nair.	Pedaliaceae	Kala til	Seed	Seed oil used for skeen infections.
Tectona grandis L.f.	Verbinaceae	Sag	Seed	Seed oil is useful for scabies
Wrightia tinctoria (Roxb.) R. Br.	Apocynaceae.	*Kala kuda.*	Seeds	Seeds are used as blood purifier and against rheumatic fever
Ricinus communis L.	Euphorbiaceae	*Arandi.*	Seeds	Seed oil is applied externally to relief from muscular pain and internally to cure constipation.
Evolvulus alsinoides (L.)L	Convolvulaceae	Chandvel	Whole plant	Whole plant used for all kinds of fever.
Abitulon indicum (L.)	Malvaceae	Mudra	Whole plant	Used as tonic, for fever and chest pain.
Boerhavia repens L. *var. diffusa Moorthy*	Nyctaginaceae	Punarnava	Whole plant	It is used for asthma, stomachic disorders.
Clematis heynei M.A. Rau	Rananculaceae	Morvel	Whole plant	Juice of plant Used for liver inflammation, for curing the eye diseases of cattle
Cissus quadrangularis L.	Vitaceae	*Halhodi.*	Whole plant	Paste of fresh plant is used to cure bone fractures in cattles.
Ixora nigricans R.Br.	Rubiaceae	Bharangi	Young leaves	Fresh leaves used for curing weakness.

Composit plant drug is obtained by mixing powders of shade dried parts of plants. It is used as a general tonic by natives. Plants and part of plants used are reported in Table 20.

Table- 20: Plants and their parts used in making composite plant drug by natives of Jarandeshwar Hill.

Sr. No.	Name of the plant	Family	Part used
1	*Azadirachta indica* A. Juss.	Maliaceae	Leaves
2	*Biophytum helenae* Busc. Muschl.	Oxalidaceae	Whole plant
3	*Pongamia pinnata* (L.) Pierre	Fabaceae	leaves
4	*Argemone maxicana* L.	Papavaraceae	Roots
5	*Gloriosa superba* L.	Liliaceare	tubers
6	*Ocimum americanum* L.	Lamiaceae	Leaves
7	*Asparagus racemosus* Willd.	Liliaceae	Tubers
8	*Gymnema sylvestre* (Retz.) R.Br.	Asclepiadaceae	Leaves

Leaf juice of *Clematis gouriana* is used in the treatment of eye lacrimation in cattle by local farmers.

c) Timber yielding plants:

Table 21 shows 24 timber plants reported from the area under study. *Lannea coromandelica, Tectona grandis,* and *Terminalia elliptica* were dominant in the vegetation. Local people used these plants to fulfil their timber needs. *Acacia catechu, Acacia nilotica* and *Grewia tilifolia* are used as fuel wood plants in the study area. People are selective in using *Acacia catechue* and *Grewia tilifolia* for fuel as these plants give white smoke and reduce blackning of utensils.

Table -21: Timber yielding plants from Jarandeshwar Hill.

Sr. No.	Botanical Name	Family	Local Name
1	*Albizia lebbeck* (L.) Bentham	Mimosaceae	*Sirish*
2	*Albizia procera* (Roxb.) Bentham	Mimosaceae	*Sirish (Pandra)*
3	*Anogeissus latifolia* (Roxb.) Wallich ex Guill. & Perrottet	Combretaceae	*Dhawda*
4	*Azadirachta indica* A. Juss	Meliaceae	*Neem*
5	*Boswellia serrata* Roxb.	Burseraceae	*Salafal*
6	*Bridelia retusa* (L.) Sprengel	Euphorbiaceae	*Kutgi*
7	*Cassia fistula* L.	Caesalpiniaceae	*Bahawa*
8	*Cassia siamea* Lamarck	Caesalpiniaceae	*Kashid*
9	*Chloroxylon swietenia* DC.	Rutaceae	*Behru*
10	*Dalbergia sissoo* Roxb.	Fabaceae	*Sisam*
11	*Flacourtia indica* (Burm.f.) Merrill	Flacourtiaceae	*Kakai*
12	*Lagerstroemia parvijlora* Roxb.	Lythraceae	*Sinha/lendi*
13	*Lannea coromandelica* (Houttuyn) Merrill	Anacardiaceae	*Mohwai*
14	*Leucaena leucocephala* (Lamarck) de Wit.	Mimosaceae	*Subabul*
15	*Pongamia pinnata* (L.) Pierre	Fabaceae	*Karanj*
16	*Pterocarpus marsupium* Roxb.	Fabaceae	*Bija*
17	*Tamarindus indica* L.	Caesalpiniaceae	*Chinch*
18	*Terminalia eliptica* Roth	Combretaceae	Not available
19	*Terminalia chebula* (Gaertn.) Retzius	Combretaceae	*Hirda*
20	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	*Behada*
21	*Tectona grandis* L.f.	Verbenaceae	*Sagwan*
22	*Acacia catechu* (L.f.) Willdenow	Mimosaceae	*Khair*
23	*Acacia nilotica* (L.) Del.	Mimosaceae	*Babul*
24	*Grewia tilifola* Vahl.	Tiliaceae	*Dhaman*

d) Plants of religious value:

Maratha community of the state has 96 units (kul). Each kul has given a specific plant for worshipping in religious functions as Devak. Following six Devak plants were recorded in study area *Calatropis gigantia, Clematis gouriana, Cocculus vilosus, Ficus bengalensis, Ficus recemosa* and *Ficus religiosa.* Following plants are used in the worship Lord Maruti (Jarandeshwar). Leaves and flowers of *Calatropis gigantia,* flowers of *Cassia absus* and wood of *Santalum album.*

Plants used by the people of the area for celebrating traditional festivals are shown in Table 22.

Table 22: Plants of religious importance from Jarandeshwar Hill.

Festival	Plant Name	Family	Local name	Part Used
Padhava	*Azadirachta indica* A. Juss.	Maliaceae	Neem	Leaves and Flowers
Budh Jayanti	*Ficus religiosa* L.	Moraceae	*Pimpal*	Whole Plant
Vat purnima	*Ficus benghalensis* L.	Moraceae	Wad	Roots
Ganesh Chaturthi	*Cynodon dactylon* Pers.	Poaceae	Durva	Whole plant
Gouripujan	*Achyranthes aspera* L.	Amaranthaceae	Aghada	Whole plant
Dasara	*Bauhinia racemosa* Lam.	Caesalpiniaceae	Apata	Leaves
Datta Jayanti	*Ficus racemosa* L.	Moraceae	*Umber*	Whole plant

Table 23: Gum, Resin, Tannin and Dye yielding plants from Jarandeshwar Hill.

Sr. No.	Name of the plant	Family	Industrial use
1	*Acacia catechu* (L.f.) Willd	Mimosaceae	Tannin
3	*Acacia leucophloea* Roxb.	Mimosaceae	Gum, Tannin, Resin
2	*Acacia nilotica* L.	Mimosaceae	Dye
4	*Anogeissus latifolia*	Combretaceae	Gum, Tannin
5	*Boswellia serrata* Roxb.	Burseraceae	Resin
6	*Bridelia retusa* L.	Euphorbiaceae	Tannin
7	*Butea monosperma* Roxb.	Fabaceae	Gum, Tanin
8	*Cassia auriculata* L.	Caesalpinaceae	Tannin
9	*Cassia fistula* L.	Caesalpinaceae	Tannin
10	*Emblica officinalis* Gaertn.	Euphorbiceae	Dye
11	*Lagerstroemia parviflora* Roxb.	Lythraceae	Tannin
12	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	Tannin
13	*Sterculia urens* Roxb.	Sterculaceae	Gum

e) Gum, Resin, Tannin and Dye yielding plants.

Table 23 represents gum, resin, dye and tannin yielding plants from Jarandeshwar hill. It includes 4 gum yielding, 1 resin yielding, 3 dye yielding and 9 tannin yielding plant species.

f) Fodder plants

Table 24 gives the list of fodder plants from Jarandeshwar hill. 31 species of 9 families were recorded as fodder yielding plants. These plants were contributed mostly by poaceae (09) and Fabaceae (8).

Table 24. Fodder plant species from Jarandeshwar Hill.

Sr. No.	Family	Name of the Species
1	**Acanthaceae:**	*Justicia diffusa* Will.
2		*Lepidagathis cristata* Will.
3		*Rungia repens* (L.) Nees
4	**Amaranthaceae:**	*Alternanthera sessilis* (L.) R. Br. ex DC.
5	**Caesalpiniaceae:**	*Cassia absus* L.
6		*Cassia tora* L.
7	**Asteraceae:**	*Ageratum conyzoides* L.
8		*Lagascea mollis* Cavan
9	**Fabaceae:**	*Alysicarpus monilifer* (L.) DC.
10		*Alysicarpus heyneanus* Wight & Arnott
11		*Crotalaria hebecarpa* (DC.) Rudd.
12		*Desmodium dichotomum* (Will.) DC.
13		*Desmodium gangeticum* (L.) DC.
14		*Desmodium triflorum* (L.) DC.
15		*Indigofera linifolia* (L.f.) Retzius
16		*Tephrosia purpurea* (L.) Persoon
17	**Convolvulaceae:**	*Evolvulus alsinoides* (L.) L.
18	**Mimosaceae:**	*Leucaena leucocephala* (Lamarck) de Wit
19	**Malvaceae:**	*Malvastrum coromandelianum* (L.) Garcke
20		*Sida acuta* Burm. f.
21		*Sida cordata* (Burm.f.) Borssum
22		*Sida cordifolia* L.
23	**Poaceae:**	*Andropogon pumilus* Roxb.
24		*Apluda mutica* L.
25		*Aristida funiculata* Trinius & Rupr.
26		*Arundinella setosa,* Trinius, Persoon
27		*Dichanlhium annulalum* Stapf
28		*Dichanthium aristatum* C.E. Hubb.
29		*Heteropogon contortus* R. & S.
30		*Chrysopogon fulvus* Chiov.
31		*Themeda quadrivalvis* O. Kuntze

Wild ornamental Plants:

Table 25 gives the list of nine wild plants which can be used as ornamental plants. It inclides 5 herbs, 2 shrubs a single species of tree and climber each. *Ceropegia, Delphinium and Gloriosa* is with underground perenating organ. Ornamental value of the plant is due to the color and shape of the flowers.

Table -25: Wild ornamental Plants from Jarandeshwar hill.

Sr. No.	Name of the plant	Family	Habit
4	*Alysicarpous pubescens* Law.	Fabaceae	Herb
3	*Barleria gibsoni* Dalz.	Acanthaceae	Shrub
9	*Cassia fistula L.*	Caesalpinaceae	Tree
8	*Ceropegia hirsuta* Wt. & Arn	Asclepiadaceae	Climber
6	*Clematis gauriana* Roxb.	Rananculaceae	Liana
2	*Delphinium malabaricum* Huth.	Rananculaceae	Herb
7	*Gloriosa superba* L.	Liliaceae	Shrub
5	*Pulicaria wightiana* DC. Cl.	Asteraceae	Herb
1	*Scenecio edgeworthii* Hook.f.	Asteraceae	Herb

Discussion:

a) Ethnobotanical aspect of botanical research is becoming popular in recent days Vartak (1980), Singh *et al.* (2000), Negi *et al.* (2003), Chaturvedi and Phanikumar (2007), Gajurel *et al.* (2007), Raut and Pandye (2007) studied edible aspect of wild plants.

Vartak observed 58 species which are commonly used as food. Singh *et al.* has described twenty aspects of ethnobotany. He has listed 34 wild edible fruits from state of Maharashtra. Negi *et al.* reported 25 wild edible plant species with agricultural value from Chhitkul of Sangla valley of Himachal Pradesh. Chaturvedi and Phanikumar recorded ethnobotananical uses of plants from Pench national park. She has included 13 wild edible plant species. Gajurel *et al.* described 80 wild edibles from Dihang and Dibang biosphere reserve of Arunachal Pradesh.

In the present study 9 plant species were recorded as wild edibles. The proportion of wild edibles in the vegetation comes to 3.84%.

b) Medicinal aspects of wild plants have been worked out by many workers like Upadhye and Kumbhojkar (2002), Samant and Mohinder (2003), Megendriyan and Ramkrishnan (2006), Parthipan (2006) and Bhattacharya (2007).

Upadhye and Kumbhojkar prepared a checklist of medicinal plants of Western Ghats.

They reported 419 species of which 416 angiosperms belonging to 112 families and 3 ferns. Diversity of Uttaranchal state studied by Samant and Mohinder. They recorded 701 species of these, 138 were trees, 135 shrubs, 421 herbs and 7 ferns. Analysis of plants on the basis of part used showed seven classes. Whole plant (179), root (120), leaves (56) fruits (12) Seeds (25), flower (10), combination of of different parts (299). Megendrian and Ramkrishnan studied diversity of medicinal plants habitwise, familywise and on the basis of part used. He reported 141 plant species belonging to 48 families. Parthipan studied biodiversity of medicinal plants of Marunduvalamalai hills. He reported 113 species with their theurapatic value which were commonly used for common diseases such as pile, rheumatism, dyscentry, diarrhoea, ulcer, diabetes, jaundice.

Present study reported 34 plants from 24 families. Study includes taxonomy, plant part used, theurapatic value of the plants. It shows similarities with most of the work cited above.

c) Timber, Gum, Resin, Tannin yielding and religious plants were studied by Sharma and Sood (1992), Singh *et al.* (2000), Singh and More (2004), Chaturvedi and Phanikumar (2007), Rout and Pandey (2007). Singh *et al.*reported that, from the total timber 80% of the revenue was obtained from *Tectona grandis.* Chaturvedi and Phanikumar reported 40 timber yielding plants from Pench national park. Raut and Pande recorded 29 species of timber plants from Simlipal biosphere reserve. Present study reports 24 timber yielding plants from 13 families.

Sharma and Sood studied 25 tannin yielding plants from Himachal Pradesh. Singh *et al.*reported 13 gum yielding, 28 tannin yielding and 5 resin yielding plants from Maharashtra. Present study reports 4 gum, 9 tannin, 2 resin and dye yielding plants.

d) Singh and More observed 10 religious plants from sacred grooves from Mulashi taluka. These plants were *Calatropis procera, Delonix regia, Ficus religiosa, Ficus benghalensis, Carthamus tinctorius, Magnifera indica, Michelia champaka, Nerium odoratum, ocimum sanctum and Plumaria acutifolia.* Present study reports 7 plants of traditional religius importance used in various festivals by Hindus. Five Devak plants were recorded in study area *Clematis gouriana, Cocculus vilosus, Ficus bengalensis,*

Ficus recemosa and *Ficus religiosa.*

e) Fodder plants of Shekavati Region studied by Kulkarni and Joshi (1992). They reported 150 fodder species belonging to 41 families as fodder plants. Out of these 30 were grasses, 4 sedges, 57 herbs, 25 shrubs and trees. Present study reports 33 fodder plants belonging to 9 families of which grasses were mostly utilized as a fodder.

f) Wild ornamental is new concept of utilizing wild resources of plants for beatification of institutes and offices. Yadav (2008) initiated this type of research. He worked on utilization and multiplication of *Barleria, Delphinium, Scenecio, and Imaptions.*

Present work reports 9 ornamental plants which were found at the Jaradeshwar hill.

Endemic plants: (Plate – 3)

Study of vegetation from Jarandeshwar hill reported 26 species which are endemic belonging to 24 genera and 22 families (Table 26). It includes 1 tree, 1 shrub, 5 climbers and 19 herbs. Six plant species of the total endemics present along four sides of the hill. Four species were observed on any three sides and nine were reported from any two sides of the hill while *Aristida redacta, Eriocaulon conicum, Exacum lawii, Kalanchoe bhidei Lophopogon tridentatus, Pinda concanese and Vigna trilobata* were reported from any one side of the hill. The proportion of endemic species in the vegetation come to 11.54% Endemic species include following economically important plants. *Barleria gibsoni, Delphinium mulabaricum, Scenecio edgeworthii* (wild ornamental), *Boswellia serrata* (Resin) *Cucumis setosus* (wild edible).

Discussion:

Endemic plants from various regions are studied by the workers like, Chatarjee (1940), Nayar (1980), Deshpande (1993), Yadav, (1994), Singh *et al.* (2000) and Karthikeyan *et al.* (2003).

Chhatarjee reported 2045 dicot, 500 monocot endemic to Peninsular India. Nayar reports 56 endemic genera from Peninsular India. Deshpande *et al.* (1993) reported 108 endemic species from Mahabaleshwar and adjoinings (Yadav, 1994) studied endemic plants from the Western Ghats. He reported 12 species endemic to Mahabaleshwar hills and 123 taxa exclusively endemic to Maharashtra. Singh *et al.* (2000) reports 694 endemic species from Maharashtra. Karthikeyan *et al.* repoted 1600 endemic plants from Western Ghats.

Table -26: Endemic plants at Jarandeshwar Hill.

Sr. No.	Botanical Name	Family	Habit	Plant Surveyed Area
1.	*Abelmoscus manihot* (L.) Medik.	Malvaceae	H	ES
1.	*Alysicarpus pubescens* var. pubescens	Fabaceae	H	EWS
2.	*Alysicarpus tetragonolobus* Edgew.	Fabaceae	H	EWS
3.	*Aristida redacta* Stapf.	Poaceae	H	E
4.	*Arundinella tuberculata* Lisboa	Poaceae	H	ES
5.	*Aspidopteris cordata* (Heyne) A. Juss.	Malphighiaceae	C	ESN
6.	*Barleria gibsoni* Dalz.	Acanthaceae	S	ES
7.	*Blumea malcolmii* (Cl.) Hook. f.	Asteraceae	H	EWS
8.	*Boswellia serrata* Roxb.	Burseraceae	T	EWNS
9.	*Chlorophytum glaucum* Dalz.	Liliaceae	H	ES
10.	*Clematis heynei* M.A. Rau	Rananculaceae	C	EWNS
11.	*Cucumis setosus* L.	Cucurbitaceae	C	ES
12.	*Delphinium mulabaricum* Huth.	Rananculaceae	H	EWNS
13.	*Eriocaulon conicum* (Fyson) Fischer	Eriocaulaceae	H	E
14.	*Exacum lawii* C.B. Cl.	Gentianaceae	H	S
15.	*Kalanchoe bhidei* Cooke.	Crassuliaceae	H	S
16.	*Lophopogon tridentatus* Hack.	Poaceae	H	E
17.	*Nilgirianthus heyneanus* (Nees)	Acanthaceae	H	EWNS
18.	*Pimpinella adscendens* Dalz.	Apiaceae	H	EW
19.	*Pimpinella wallichiana* (Miq.) Gandhi	Apiaceae	H	ES
20.	*Pinda concanese* (Dalz.)	Apiaceae	H	E
21.	*Pleocaulus ritchiei* (Cl.) Bremek	Acanthaceae	H	WN
22.	*Scenecio edgeworthii* Hook.f.	Asteraceae	H	EWNS
23.	*Tricholepis radicans* (Roxb.) DC.	Asteraceae	H	EWNS
24.	*Ventilago maderaspatana* Gaertn.	Rhamnaceae	C	ES
25.	*Vigna trilobata* (L.) Verd.	Fabaceae	C	S