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## **DIVERSITY, DISTRIBUTION AND MICROCLIMATIC CONDITIONS DURING FIELD SURVEY OF FOUR ETHNOMADICINAL *CHEILANTHES* SPECIES FROM NORTHERN WESTERN GHATS OF INDIA**

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**ABSTRACT:** Field survey was conducted between October 2013 and June 2014 to determine the diversity, distribution, and microclimatic conditions of four ethno medicinal ferns in Pteridaceae family such as *Cheilanthes* sp.: *C. farinosa*, *C. anceps*, *C. tenuifolia*, and *C. albomarginata* from Northern Western Ghats of India. By their diverse ecological as well as topographical conditions in Northern Western Ghats of India support diversified floral components. The current effort was undertaken to count the four ethno medicinal ferns in Pteridaceae family such as *Cheilanthes* sp.: *C. farinosa*, *C. anceps*, *C. tenuifolia*, and *C. albomarginata* from Northern Western Ghats of India. To fill the information gap of effective documentation of the four ferns *Cheilanthes* sp.: *C. farinosa*, *C. anceps*, *C. tenuifolia*, and *C. albomarginata* from the Northern Western Ghats area. During this field survey authors observed Diversity, Distribution and microclimatic conditions during field survey as well as collected four species of *Cheilanthes* sp.: *C. farinosa*, *C. anceps*, *C. tenuifolia*, and *C. albomarginata* ferns were obtained from different localities of Northern Western Ghats of India.

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**KEY WORDS:** *Cheilanthes* species, Northern Western Ghats, Ferns, Diversity, microclimatic conditions.

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## 1. INTRODUCTION

The Northern Western Ghats of India is a rich source of pteridophytes and wide-ranging flora for the reason that of its diversified topography as well as diverse climatic conditions. The ferns and its fern allies (Division: Pteridophytes) consist of an essential constituent of this flora. In recent times comprehensive study of ferns and fern allies of Northern Western Ghats hills of Maharashtra has been conducted by Sachin Patil et al (2012). Jadhav et. al (2011) studied the ferns and fern allies of Koyna-wild life sanctuary as well as some reports by Carstensen, G.H. (1891), Mahabale, T.S. (1938), Shende, D.V. (1945), Beddome (1883), Bole & Almeida (1977 & 1989), Naiknaware (1983) and Manickam & Irudayaraj (2009). On the other hand, these information provide a indistinguishable distribution of the species studied and lack of location specific data. This highlights the essential for an in-depth survey and documentation of pteridophytes in this Northern Western Ghats region. For that reason, the current study goals to arrange for a basic understanding of pteridophytes flora in the Northern Western Ghats of India, which might be provide direction to future Pteridophytes plant workers in this field. This paper reports four ethno medicinal ferns in Pteridaceae family such as *Cheilanthes* sp.: *C. farinosa*, *C. anceps*, *C. tenuifolia*, and *C. albomarginata* from Northern Western Ghats of India ferns collected from different localities of Northern Western Ghats of India.

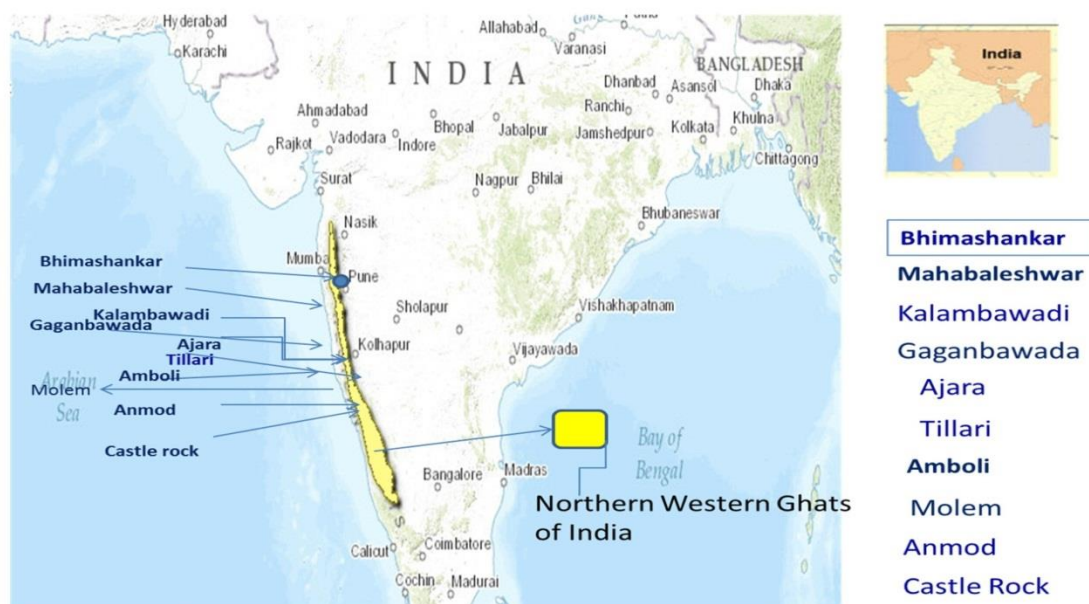
## 2. MATERIALS AND METHODS

### Study area

Area was visited several times during different seasons of the year 2012 -2014 especially rainy season. Field notes and photography were taken at the time of collection to observe habits, Habitats and localities, Humidity, Temperature, Latitude and Longitude by using thermo hygrometer during the survey photographs of plants were taken. Northern Western Ghats of India was covered for representative study plate 1.

### Diversity and Distribution of Genus *Cheilanthes* from Northern Western Ghats:

The study of the distributions of Genus *Cheilanthes* along the environmental gradients, viz. habitat habit, atmospheric humidity, altitude, elevation, temperature, rainfall was carried out. The altitude range was measured through Garmin GPSmap 60CSx (GPS).



**Study Area Showing Different Localities**

Sr. No	Name of the <i>Cheilanthes</i> species	Habitat	Distribution
1	<i>Cheilanthes albomarginata</i> Clarke.	Mostly grow on rock crevices along the road sides.	Molem, Gaganawada, Tillari, Aajra, Amboli, Bhimashakar, Koyna , Mahabaleshwar,
2	<i>Cheilanthes tenuifolia</i> (Burm.f.) Sw.	Grow in moist and shady places in forest floor along roadsides.	Molem, Tillari, Amboli, Pachgani, Mahablesshwar,Gaganawada, Kalamawadi
3	<i>Cheilanthes anceps</i> Sw.	Abundant along hill slopes in brown lime rich soil and along forest	Amboli, Tillari, Gaganawada, Radhanagri, Koyna
4	<i>Cheilanthes farinosa</i> (Forssk.) Kaulf.	Grow on rock crevices.	Molem,Gaganawada,Tillari, Aajra, Amboli, Bhimashakar,
5	<i>Cheilanthes rufa</i>	Grow in moist and shady places	Mahabaleshwar, Kas Platue
<b>Localities of <i>Cheilanthes</i> species collected</b>			

**Plant collection, Methods of identification of Fern - *Cheilanthes* species**

Over wide-ranging field tours the genus *Cheilanthes* SW. were collected during July – September 2012 to 2014 from different localities in Northern Western Ghats of India (Table 1, 2, 3, 4, 5). The specimens of the genus *Cheilanthes* SW. were collected from the study area and treated in the laboratory. The collected samples were poisoned through dipping into 4% formalin used for a day. They were dehydrated and attached on the herbarium sheets by using fevicol gum. The plant material was authenticated by specimens identified with help of Dr. Manisha Kale (Associate Professor Department of Botany, Jaysingpur College Jaysingpur, Maharashtra, India) (Identification of different *Cheilanthes* species was implemented by using floras described by Beddome (1883), Blatter & Almeida (1922) and Manickam & Irudayaraj (1992) and the herbarium voucher specimens are deposited in the Department of Botany, Shivaji University, Kolhapur.

**3. RESULTS AND DISCUSSION**

A critical inspection of the related literature has been prepared for the *Cheilanthes* genus under the study. In depth information of the *Cheilanthes* genus like occurrence, status, distribution and diagnostic characters were assembled from numerous authentic localities sources as shown in Table 1 shows Diversity and Distribution of *Cheilanthes albomarginata* Clarke. From Northern Western Ghats. Table 2 shows Diversity and Distribution of *Cheilanthes tenuifolia* (Burm.f.) Sw. from Northern Western Ghats, Table 3. Show Diversity and Distribution of *Cheilanthes anceps* Blanf. From Northern Western Ghats, Table 4 Diversity and Distribution of *Cheilanthes farinosa* (Forssk.) Kaulf. .from Northern Western Ghats, Table 5 shows Diversity and Distribution of *Cheilanthes rufa* D. Don. From Northern Western Ghats as well as Fig. Plate 1 shows the distribution of *Cheilanthes* species from Northern Western Ghats India, based on their Pteridaceae families of four *Cheilanthes* species were recorded in Table 1, 2, 3, 4 and 5 of which is 1 to 4 table species were occurred in maximum diversity of Fern- *Cheilanthes* species was observed in the four different localities from Northern Western Ghats of India such as (*Cheilanthes farinosa* (Forssk.) Kaulf. — Molem locality, *Cheilanthes anceps* Sw, — Mahabaleshwar locality, *Cheilanthes tenuifolia* (Burm.f.) Sw, — Gaganbawada locality, *Cheilanthes albomarginata* Clarke — Amboli locality and it's indicated that (for \*\*\* Indicates species highly occurred and \* \* indicates species are very rare occurred. All the species was measured to be common in the studied area and total reported in 9 localities (Table 1 to 5). But

*Cheilanthes rufa* D.Don is very rared species and occurred only Mahabaleshwar and KAS as shown in Table 5. So these four *Cheilanthes* species are ethnomedicinal purpose used various aboriginals' peoples in Northern Western Ghats of India

Table 1: Diversity and Distribution of *Cheilanthes albomarginata* Clarke. From Northern Western Ghats

Sr. No.	Name of place plant collected	Elevation (meter)	Latitude	Longitude	Temperature (°c)	Humidity (%)
1	Molem ***	16	15°22'09"N	74°12'44"E	26	80
2	Gaganbawada ***	80	16°31'58"N	73°49'05"E	23	82
3	Tillari *	250	15°48'12"N	74°10'02"E	20	86
4	Aajra *	660	16°06'50"N	74°13'17"E	22	83
5	Amboli ***	690	15°57'42"N	73°59'48"E	19	86
6	Mahableswar ***	1353	17°55'31"N	73°39'45"E	20	89
7	Koyna *	1235	17°43'30"N	73°49'31"E	'21	87
8	Pachgani *	1293	17°55'24"N	73°49'11"E	19	89
9	Anmod *	600	15°16'96"N	74°27'08"E	20	88
<b>*** Indicates species highly occurred and ** indicates species are very rare occurred</b>						

Table 2: Diversity and Distribution of *Cheilanthes tenuifolia* (Burm.f.) Sw. from Northern Western Ghats:

Sr. No.	Name of place plant collected	Elevation (meter)	Latitude	Longitude	Temperature (°c)	Humidity (%)
1	Molem ***	16	15°22'09''N	74°12'44''E	26	80
2	Tillari	250	15°48'12''N	74°10'02''E	22	89
3	Amboli ***	690	15°57'42''N	73°59'48''E	21	87
4	Aajra *	660	16°06'50''N	74°13'17''E	23	84
5	Mahableswar ***	1353	17°55'31''N	73°39'45''E	22	89
6	Gaganbawda ***	80	16°31'58''N	73°49'05''E	22	85
7	Kalambawadi *	100	16°35'60''N	74°50'6''E	24	82
8	Bhimashankar *	1034	19°07'55''N	73°33'14''E	25	80
<b>*** Indicates species highly occurred , and ** indicates species are very rare occurred</b>						

Table 3: Diversity and Distribution of *Cheilanthes anceps* Blanf. from Northern Western Ghats

Sr. No.	Name of place plant collected	Elevation (meter)	Latitude	Longitude	Temperature (°c)	Humidity (%)
1	Kalambawadi *	100	16°35'60''N	74°50'6''E	23	83
2	Tillari *	250	15°48'12''N	74°10'02''E	20	86
3	Amboli ***	690	15°57'42''N	73°59'48''E	19	86
4	Radhanagri *	114	16°24'40''N	73°59'57''E	24	80
5	Koyna *	1235	17°43'30''N	73°49'31''E	21	87
6	Gaganbawda ***	80	16°31'58''N	73°49'05''E	23	82
7	Castle rock *	621	15°23'52." N,	74°19'55" E	21	85
<b>*** Indicates species highly occurred , and ** indicates species are very rare occurred</b>						

Table 4: Diversity and Distribution of *Cheilanthes farinosa* (Forssk.) Kaulf. From Northern Western Ghats:

Sr. No.	Name of place plant collected	Elevation (meter)	Latitude	Longitude	Temperature (°c)	Humidity (%)
1	Gaganbawda ***	80	16°31'58"N	73°49'05"E	23	85
2	Kalambawadi	100	16°35'60"N	74°50'6"E	25	82
3	Tillari	250	15°48'12"N	74°10'02"E	22	89
4	Amboli ***	690	15°57'42"N	73°59'48"E	21	87
5	Radhanagri	114	16°24'40"N	73°59'57"E	24	80
6	Koyna	1235	17°43'30"N	73°49'31"E	21	89
7	Malshej ghat	700	19°34'06"N	73°77'46"E	25	86
<b>*** Indicates species highly occurred , and ** indicates species are very rare occurred</b>						

Table 5: Diversity and Distribution of *Cheilanthes rufa* D.Don. From Northern Western Ghats:

Sr. No	Name of place plant collected	Elevation (meter)	Latitude	Longitude	Temperature (°c)	Humidity (%)
1	Mahableshwar *	1353	17°55'31"N	73°39'45"E	20	89
2	Kas *	1200	177201	738227"E	22	85
<b>* indicates species are very rare occurred</b>						

So that signifying that these species are under persistent threat of being completely exhausted due to loss and variations of habitation. This result has been useful with the work of Benniamin et al. (2008) and Sachin Patil et al. (2012) i.e. several of the ferns similar to *Hypodematum crenatum* and *Osmunda huegeliana*, are infrequent. *Blechnum orientale*, *Bolbitis aspleniifolia*, *B. presiliana*, *B. virens*, and *Lygodium flexuosum*, are at risk. Even though remaining species are common to hills of Northern Western Ghats, India Patil et al. (2012).

#### 4. CONCLUSION

*Cheilanthes* Species such as *C. farinosa*, *C. anceps*, *C. tenuifolia*, and *C. albomarginata* are important to be conserved in their natural habitat as well as recovery actions are needed for conservation of the rare and threatened *Cheilanthes* species. For the endanger zone of extinction and helpless species, it is necessary to maintain and conserve the regions of their individual territories. Further studies should be marked at discovering new populations of *Cheilanthes* species and subsequently accelerating the details to the IUCN Threatened Species Section.

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