

## A Preliminary Population Inventory of *Ctenitis maritima* (Cordem.) Tardieu at Gris Gris, South Coast of Mauritius (Polypodiales: Dryopteridaceae)

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**ABSTRACT:** The Mascarenes endemic fern species *Ctenitis maritima* (Cordem.) Tardieu has been collected in Mauritius and Réunion Island only. The preliminary population survey undertaken at Gris Gris, in the south coast of Mauritius has indicated the presence of 80 clumps. We measured only 52 fronds due to inaccessibility of some clumps and the frond sizes varied from 4.3 to 42.8 cm in length and from 3.1 to 13.2 cm in width. Most clumps georeferenced, were at an elevation of 7 to 13 m. Nearly 90% of the population surveyed bears fertile fronds.

**RÉSUMÉ:** La fougère endémique *Ctenitis maritima* (Cordem.) Tardieu a été recueillie à l'île Maurice et à la Réunion uniquement. L'enquête préliminaire de la population entreprise à Gris Gris, sur la côte sud de l'île Maurice a indiqué la présence de 80 touffes. Nous avons mesuré seulement 52 frondes en raison de l'inaccessibilité de certaines touffes et les tailles des frondes variaient de 4,3 à 42,8 cm de longueur et de 3,1 à 13,2 cm de largeur. La plupart des touffes géoréférencées, étaient à une altitude comprise entre 7 et 13 m. Près de 90% des individus mesurés portent des feuilles fertiles.

**KEYWORDS:** endemic species, size variability, Mascarenes.

**MOTS CLÉS:** espèce endémique, variation de la taille, Mascareignes.

### INTRODUCTION

*Ctenitis* (C. Chr.) C. Chr. ex Tardieu-Blot & C. Chr. belonging to the Dryopteridaceae is composed of about 150 species distributed throughout the world (MICKEL & SMITH, 2004). In the Mascarenes, which are comprised of Mauritius, Réunion Island and Rodrigues, twelve species or subspecies are known, where *C. desvauxii* Tardieu, *C. bivestita* (Mett.) Tardieu, *C. pauciflora* (Kaulf) Holtt., *C. crinita* var. *crinita* (Poir. in Lam.) Ching, *C. crinita* var. *atrata* Holtt., *C. crinita* var. *setacea* Holtt. are only present in Mauritius, with *C. maritima* (Cordem.) Tardieu. In Réunion Island, five species of *Ctenitis* are known, mainly *C. borbonica* (Bak.)Tardieu, *C. cyclochlamys* (Fée) Holtt., *C. humida* (Cordem.) Holtt. three endemic species, with *C. cirrhosa* (Schum.) Ching and *C. maritima*. In Rodrigues, *C. lorencei* Holtt. is the only species of the genus confined to its territory (BADRÉ *et al.*, 2008).

Endemic to both Mauritius and Réunion Island, *C. maritima*, is the only easily recognizable species from the other *Ctenitis* present, mainly by its frond appearance. One interesting feature of this terrestrial fern is its capacity to exist in rocks near the sea and also at higher altitudes (up to 800 m) in both islands (BADRÉ *et al.*, 2008).

Moreover, bearing in mind that according to GRANGAUD (2010), the fronds of *C. maritima* can reach up to 80 cm in length and also that the Mauritian plants are considerably smaller compared to those in Reunion Island (BADRÉ *et al.*, 2008), puts us on the track to undertake a

preliminary survey in order to collect data concerning its habitat, population, frond size and at which elevation they are present on the study site.

## MATERIALS AND METHODS

### STUDY AREA

The whole study area is situated in the south coastal region of Mauritius, in the Savanne District, in the village of Souillac (20°31'30" S and 57°31'49" E), between 'La roche qui pleure' and La Nef Museum, formerly the home of the Mauritian poet Robert Edward Hart. Most part of this area comprises steep cliffs where access was almost limited, whereas the other part borders the sandy beach of Gris Gris. Altitude varies from 2 to 15 m above sea level (a.s.l.). Its climate is relatively warm and humid, with a mean annual temperature of 28°C, and annual rainfall between 1600 and 1900 mm (WILLAIME, 1984). The studied area is composed mainly of basalt cliffs along reefless coast, exposed to the south east wind.

This place also harbors colonies of other native coastal species like *Selaginella concinna* (Sw.) Spring (Selaginellaceae), *Pemphis acidula* J. R. et G. Forster (Lythraceae), *Stenotaphrum dimidiatum* (L.) Brongn. (Poaceae), *Zoysia matrella* (L.) Menill (Poaceae), *Scaevola taccada* (Gaertn.) Roxb. (Goodeniaceae), *Dichondra repens* J.R.et G.Forst. (Convolvulaceae), *Cissus annulata* Descoings (Vitaceae) and *Fimbristylis cymosa* R. Br. (Cyperaceae). Exotic species observed locally there are: *Casuarina equisetifolia* J.R. et G.Forst. subsp. *equisetifolia* (Casuarinaceae), *Furcraea foetida* (L.) Haw. (Agavaceae), *Sonchus oleraceus* L. (Asteraceae) and *Tridax procumbens* L. (Asteraceae).

### SURVEY

Field surveys were undertaken in July 2013, including three days of intensive counts. For all measurements taken in each clump we, firstly, measured longest blade length (*Fig. 1a*); secondly longest blade width (*Fig. 1b*); thirdly, we inventoried species growing in the close vicinity, and fourthly, we recorded the absolute location together with elevation of each clump using a GPS (WGS 84) (*Fig. 2b*).

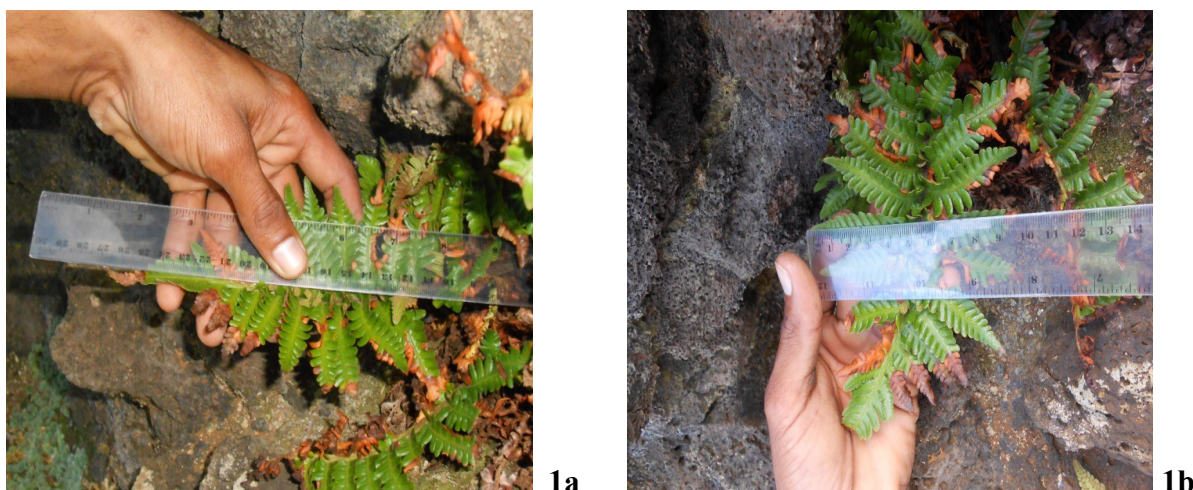


Figure 1. — Measurements of *Ctenitis maritima* (Cordem.) Tardieu in Mauritius: 1a) Length of longest blade; 1b) Width of longest blade. Photos by K. Pynee.



Figure 2. — Sea cliffs at Gris Gris: 2a) Habitat of *C. maritima*; 2b) Georeferencing each clump of *C. maritima*. Photos by K. Pynee.

### Specimens from Mauritius and Reunion Island examined

MAURITIUS. Gris Gris, 30 October 1974, *Lorence D.* (MAU 16771) ; Gris Gris, 21 October 1973, *Julien R.* (MAU 16331) ; Bassin Blanc, 06 November 1967, *Edgerley, L. F.* (MAU 13102) ; Bel Air, 01 November 1967, *Barclay C.* (MAU 12736). REUNION ISLAND. Palmiste Grove, 30 May 1964, *Staub F.* (MAU 11137).

## RESULTS & DISCUSSION

Out of the 80 clumps, we only measured 52 fronds due to inaccessibility of some of them which were at higher altitudes and in very steep slopes. The frond sizes varied from 4.3 to 42.8 cm in length and from 3.1 to 13.2 in width. Most *C. maritima* georeferenced, were at an elevation of 7 to 13 m. In all clumps measured, all fronds were fertile.

In addition, this study showed that in exposed areas, the blade lengths were much shorter than in areas that were protected by other taller species like *Scaevola taccada* (Gaertn.) Roxb. and also those that were growing in deep rock cavities (*Tab.1*). The impact of different altitudes may influence the growth of *C. maritima*, with the availability of water and salt spray, though not measured.

## CONCLUSION

Due to inaccessibility of certain patches at the 'Gris Gris' site, almost half of the *C. maritima* population is under surveyed, especially at higher elevations and also where the cliffs are remote and very steep and are prone to erosion. Hence, we recommend that further efforts should be devoted with other stakeholders and other experts to complete this data collection and also in other areas of the country and moreover to delineate the extent of its population. For future prospects, for data collected to be interpreted statistically and what factors are impacting on the frond sizes of *C. maritima*, other parameters like pH, soil nutrients and moisture content should be measured. Another similar survey could be undertaken in Réunion Island where data collected could be compared with those of Mauritius.



Table 1. – *Ctenitis maritima* populations from Gris-Gris (Mauritius) : Latitude, longitude, length of longest frond, width of longest frond, elevation, observations.

No.	Latitude (S)	Longitude (E)	Length of longest frond (cm)	Width of longest frond (cm)	Elevation (m)	Observations
1	20°31'30.4"	57°31'51.1"	41.4	10.2	12	With <i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> , <i>Stenotaphrum dimidiatum</i> , <i>Pemphis acidula</i> , <i>Scaevola taccada</i> & <i>Zoysia matrella</i>
2	20°31'30.3"	57°31'51.1"	25.0	8.2	12	With <i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> and <i>Dichondra repens</i>
3	20°31'30.4"	57°31'50.9"	35.6	10.4	13	With <i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> and <i>Dichondra repens</i>
4	20°31'30.4"	57°31'51.1"	42.8	10.0	13	With <i>Selaginella sp</i> and <i>Dichondra repens</i>
5	20°31'31.0"	57°31'50.7"	10.4	5.3	9	With <i>Stenotaphrum dimidiatum</i>
6	20°31'31.1"	57°31'50.9"	11.8	4.8	9	With <i>Selaginella sp</i>
7	20°31'31.2"	57°31'50.4"	7.5	3.6	12	With <i>Fimbristylis cymosa</i>
8	20°31'31.0"	57°31'50.5"	6.2	3.1	12	Dry fronds present
9	20°31'31.2"	57°31'50.5"	4.3	1.7	12	Dry fronds present
10	20°31'31.4"	57°31'50.5"	7.20	2.60	11	Dry fronds present
11	20°31'31.2"	57°31'49.4"	30.40	9.10	10	In association with <i>Scaevola taccada</i>
12	20°31'31.1"	57°31'49.2"	16.20	6.20	10	Dry fronds present
13	20°31'31.1"	57°31'49.2"	19.50	6.80	9	With <i>Selaginella sp</i> and <i>Dichondra repens</i>
14	20°31'31.0"	57°31'49.1"	14.40	5.10	8	Dry fronds present
15	20°31'31.0"	57°31'49.1"	15.30	6.10	8	Dry fronds present
16	20°31'32.0"	57°31'48.3"	31.50	9.00	8	Dry fronds present
17	20°31'31.6"	57°31'48.7"	14.00	7.20	9	Dry fronds present
18	20°31'31.9"	57°31'48.5"	11.00	7.00	8	Dry fronds present
19	20°31'31.8"	57°31'48.5"	13.10	5.20	13	Dry fronds present
20	20°31'31.9"	57°31'48.4"	15.50	8.70	13	Dry fronds present
21	20°31'32.0"	57°31'48.6"	7.30	4.20	10	Dry fronds present
22	20°31'31.7"	57°31'48.5"	22.00	8.20	11	Dry fronds present
23	20°31'31.8"	57°31'48.3"	9.30	5.50	11	Dry fronds present
24	20°31'31.8"	57°31'48.3"	13.10	5.00	12	Dry fronds present
25	20°31'31.9"	57°31'48.4"	39.30	13.20	10	Well protected in rock cavity; Sample taken
26	20°31'31.8"	57°31'48.3"	8.50	6.40	10	Dry fronds present
27	20°31'31.8"	57°31'48.3"	31.10	12.20	10	Dry fronds present ; well protected
28	20°31'31.2"	57°31'48.4"	16.20	8.00	8	Dry fronds present
29	20°31'31.7"	57°31'48.2"	23.30	8.20	8	Dry fronds present
30	20°31'31.7"	57°31'48.6"	17.10	7.10	12	Dry fronds present
31	20°31'31.7"	57°31'48.6"	8.30	4.00	12	Dry fronds present
32	20°31'31.4"	57°31'48.1"	N/A	N/A	8	Dry fronds present
33	20°31'31.4"	57°31'48.1"	N/A	N/A	9	Dry fronds present
34	20°31'31.4"	57°31'48.1"	N/A	N/A	8	Dry fronds present
35	20°31'26.1"	57°31'58.9"	N/A	N/A	6	In steep cliff ; inaccessible
36	20°31'26.1"	57°31'58.9"	N/A	N/A	13	In steep cliff ; inaccessible
37	20°31'26.1"	57°31'58.9"	N/A	N/A	13	In steep cliff ; inaccessible
38	20°31'26.1"	57°31'59.5"	N/A	N/A	12	In steep cliff ; inaccessible
39	20°31'26.3"	57°31'59.4"	19.00	10.40	7	Dry fronds present
40	20°31'26.4"	57°31'59.6"	16.70	7.60	7	Dry fronds present
41	20°31'26.4"	57°31'59.6"	8.01	4.00	7	Dry fronds present
42	20°31'26.4"	57°31'59.6"	10.00	6.20	7	Dry fronds present
43	20°31'26.4"	57°31'59.6"	N/A	N/A	10	Inaccessible, approximate absolute location
44	20°31'26.4"	57°31'59.6"	N/A	N/A	10	Inaccessible, approximate absolute location
45	20°31'26.7"	57°31'59.9"	N/A	N/A	11	Inaccessible, approximate absolute location
46	20°31'26.7"	57°31'59.9"	N/A	N/A	10	Inaccessible, approximate absolute location
47	20°31'26.7"	57°31'59.9"	N/A	N/A	10	Inaccessible, approximate absolute location
48	20°31'26.7"	57°31'59.9"	N/A	N/A	10	Inaccessible, approximate absolute location
49	20°31'26.7"	57°31'59.9"	N/A	N/A	10	Inaccessible, approximate absolute location
50	20°31'26.0"	57°32'00.0"	34.00	12.00	10	Dry fronds present

Table 1. (continued) – *Ctenitis maritima* populations from Gris-Gris (Mauritius) : Latitude, longitude, length of longest frond, width of longest frond, elevation, observations.

No.	Latitude (S)	Longitude (E)	Length of longest frond (cm)	Width of longest frond (cm)	Elevation (m)	Observations
51	20°31'26.0''	57°32'00.0''	28.60	10.40	10	Dry fronds present
52	20°31'26.8''	57°32'00.2''	42.00	10.00	11	Dry fronds present
53	20°31'26.8''	57°32'00.2''	33.40	10.90	11	Dry fronds present
54	20°31'26.8''	57°32'00.2''	25.00	11.00	11	Dry fronds present
55	20°31'26.8''	57°32'00.2''	N/A	N/A	14	Inaccessible, approximate absolute location
56	20°31'27.0''	57°32'00.8''	22.00	8.00	12	Dry fronds present
57	20°31'26.4''	57°32'00.9''	8.40	4.60	9	Dry fronds present
58	20°31'26.4''	57°32'00.9''	13.00	5.80	9	Dry fronds present
59	20°31'26.4''	57°32'00.9''	32.00	9.40	8	Dry fronds present
60	20°31'26.4''	57°32'00.9''	N/A	N/A	8	Inaccessible, approximate absolute location
61	20°31'26.4''	57°32'00.9''	N/A	N/A	8	Inaccessible, approximate absolute location
62	20°31'26.4''	57°32'00.9''	30.00	9.30	8	Dry fronds present
63	20°31'26.9''	57°32'01.5''	18.00	5.50	7	Dry fronds present
64	20°31'27.1''	57°32'02.0''	N/A	N/A	20	Inaccessible, approximate absolute location
65	20°31'27.8''	57°32'02.4''	17.20	10.30	12	Dry fronds present
66	20°31'27.8''	57°32'02.4''	21.00	9.00	12	Dry fronds present
67	20°31'27.8''	57°32'02.4''	28.00	12.00	12	Dry fronds present
68	20°31'27.6''	57°32'02.5''	N/A	N/A	12	Inaccessible, approximate absolute location
69	20°31'27.0''	57°32'02.7''	21.00	7.00	12	Dry fronds present
70	20°31'27.0''	57°32'02.7''	18.00	9.20	12	Dry fronds present
71	20°31'27.0''	57°32'02.7''	N/A	N/A	20	Inaccessible, approximate absolute location
72	20°31'27.0''	57°32'02.7''	N/A	N/A	20	Inaccessible, approximate absolute location
73	20°31'26.0''	57°32'03.3''	37.30	9.20	7	Dry fronds present
74	20°31'26.0''	57°32'03.3''	17.00	9.00	7	Dry fronds present
75	20°31'26.6''	57°32'03.6''	N/A	N/A	18	Inaccessible, approximate absolute location
76	20°31'26.5''	57°32'04.1''	15.20	9.00	7	Dry fronds present
77	20°31'26.1''	57°32'05.8''	32.50	12.70	9	Dry fronds present
78	20°31'25.7''	57°32'05.5''	18.00	10.00	8	Dry fronds present
79	20°31'25.7''	57°32'05.5''	18.50	8.00	8	Dry fronds present
80	20°31'25.8''	57°32'05.7''	N/A	N/A	12	Inaccessible, approximate absolute location

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