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Size structure of tussocks of a population of *Deschampsia antarctica* Desv. in Robert Island, Maritime Antarctica

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SUMMARY

The distribution and size structure of tussocks of the population of Deschampsia antarctica *Desv. was studied in the Coppermine Peninsula, Robert Island. Different study sites showed predominance of smaller turfs. This suggests that* D. antarctica *is a colonizing species in the peninsula. The plant was found in small patches in 15 sites, being the total amount of tussocks in the island less than 10,000. Coverage by* D. antarctica *in these patches ranged from 0.18 % to 1.96 %.* Colobanthus quitensis *(Kunth) Bartl. was not found in Robert Island.*

Key words : Gramineae, Coppermine Peninsula.

Estructura de tamaño de clones en la población de *Deschampsia antarctica* Desv. en isla Robert, Antártica Marítima.

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RESUMEN

Se describe la distribución de Deschampsia antarctica *Desv. en la península Coppermine, isla Robert. La estructura de tamaño de los clones en la población de diferentes sitios de estudio, muestra predominancia de las champas más pequeñas. Esto sugiere que* D. antarctica *es una especie colonizadora en la península. La planta fue hallada en pequeños parches en 15 lugares, siendo el número total de champas en la isla menor de 10.000. La cobertura de* D. antarctica *en estos sitios fluctuó entre 0,18 % y 1,96 % . No se encontró* Colobanthus quitensis *(Kunth) Bartl. en la Isla Robert.*

Palabras claves: Gramineae, península Coppermine.

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INTRODUCTION

Deschampsia antarctica Desv. and *Colobanthus quitensis* (Kunt) Bartl. are the two vascular plants that have colonized vast areas in the Maritime Antarctic and Antarctic Peninsula (Komarkova *et al.*, 1990; Moore, 1970). These plants have raised interest because of their uniqueness in surviving under the harsh antarctic conditions (Edwards and Lewis-Smith, 1988). In addition, *D. antarctica* is found in Southern South America and Sub-Antarctic areas (Moore, 1970). *Colobanthus quitensis* is also found through the Andes in South America. In this paper, the distribution and size structure of tussocks of the populations of *D. antarctica* at several sites in the island are described. This study will allow to determine whether *D. antarctica* is a colonizing or established species in the Coppermine Peninsula, Robert Island.

METHODS

The population of *D. antarctica* existing in Robert Island (62°22'S., 59°43'W., Maritime Antarctic) was censed. This plant usually grows in Robert Island as isolated tussocks. The areas of the sites where this species was found were recorded and all the individual tussocks were counted and measured. The size of each tussock was classified in five centimeters intervals. The size structure distribution at different sites were compared by the non-parametric test for two samples of Kolmogorov-Smirnov Conover, 1980).

The coverage in each site was estimated from the above data. The exposition of each site was determined by means of a compass. Inclinations were estimated by mesasuring the distance necessary to decrease 1 m in heights.

RESULTS AND DISCUSSION

Morphology of turfs

The most common growth form of *D. antarctica* is of small tussocks less than 10 cm high. The size of the aerial part of the ramets was 6.1 ± 0.4 cm (n=10). It grows in tussocks by the addition of ramets (shoots, leaves and roots of adventitious origin) in all directions of a plane. However, the ramets in the center of the turfs are distinguished by having short internodes and by growing in vertical direction. Ramets at the border of the turfs have long internodes, allowing the expansion of the clone (Fig. 1).

Small tussocks are composed by only a few ramets. Ramets may break away from the mother plant and colonize nearby places. They are likely to be the fundamental structures involved in the colonizing process in Coppermine. Colonization may also take place simultaneously by seed production. Ramets detachment and spikes formation were observed in Robert Island. Seed production and germination rates are still to be determined.

Presence and distribution of *D. antarctica* in Robert Island

This plant was found in 15 sites scattered in the Coppermine Peninsula and deglaciated areas as shown in the map (Fig. 2). The size of these sites ranged between 3 m^2 and 2,633 m^2 (Table 1). The slopes, expositions, and inclinations of the sites are also shown in Table 1. Contradictory reports about the presence of *D. antarctica* in Robert Island exist (Komarkova *et al.*, 1990; Lindsay, 1971). Since the total number of tussocks in the island is low (less than 10,000), and they are found in restricted places, they may be easily missed. *Colobanthus quitensis* was not found in the Coppermine Peninsula, Robert Island. Moreover, it was not found after six expeditions and we did not find any report about its presence in this peninsula. Since the rest of the island is still glaciated, it is unlikely to be found elsewhere.

Population structure

The Kolmogorov-Smirnov test for two samples showed the probabilities of similarity among the distributions of turfs diameters ($p > 0,05$). The highest values of similarity found were: 1 for sites 1 and 2, 1 and 12, 2 and 8, 2 and 9, 2 and 12, 2 and 13, 8 and 12, 9 and 12, 12 and 13; and 0.99 for sites 1 and 13, 2 and 10, 8 and

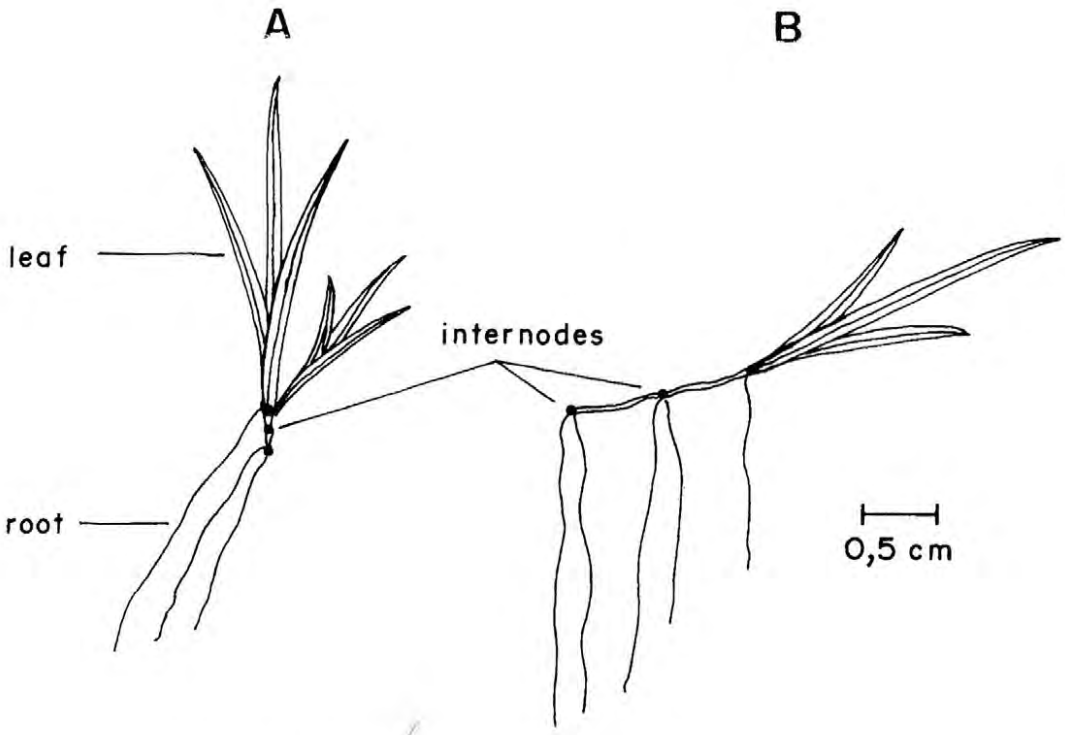

Fig. 1. *Deschampsia antarctica* in the Coppermine Peninsula, Robert Island (2X). A: Ramet growing in the center of a tussock with short internodes and B: in the border of a tussock with long internodes.

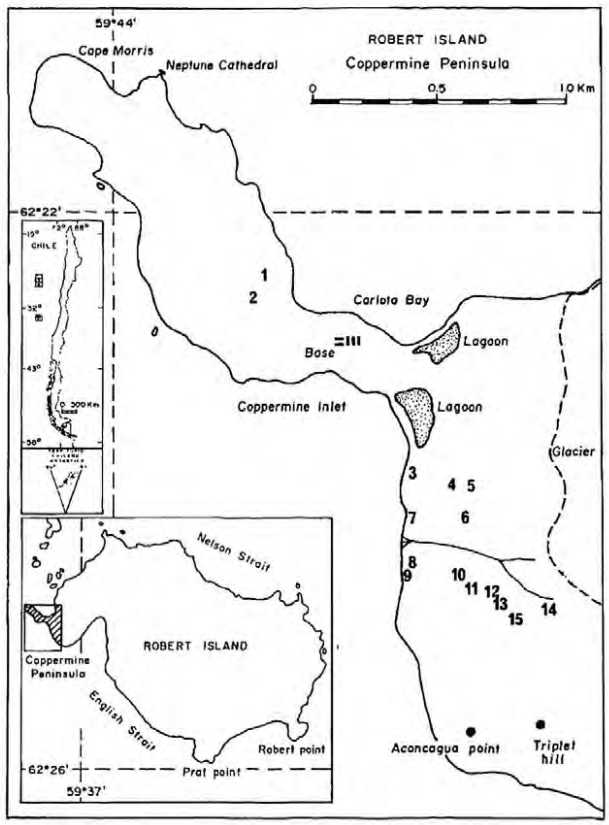

Fig. 2. Sites where *Deschampsia antarctica* was found in the Coppermine Peninsula, Robert Island.

Table 1

CHARACTERISTICS OF STUDY SITES AND ABUNDANCE OF *D. ANTARCTICA* TUSSOCKS IN ROBERT ISLAND.

Site	Exposition	Inclination (degree)	Area (m^2)	Number of Tussocks
1	NE	5.7	251	158
2	NE	5.7	812	483
3	NO	11.5	19	78
4	NE	3.8	542	791
5	N	5.5	457	1497
6	N	2.9	6	35
7	O	9.6	62	25
8	N	3.6	680	1265
9	SO	3.8	585	1232
10	N	19.5	533	306
11	NE	8.3	44	107
12	N	8.2	1155	1308
13	N	9.6	2633	2180
14	N	3.8	17	37
15	N	4.8	3	23

13, 9 and 13, and between 10 and 12. These results suggest the existence of two groups within the sampled populations in the Coppermine Peninsula: Group I is composed by sites 1, 2, 8, 9, 10, 11, 12 and 13; Group II is composed by sites 3, 4, 5, 6, 7, 13, 14 and 15. Group I has two sites located at one extreme of the peninsula and the others are located near Punta Aconcagua (Fig. 2). Sites of group II are located between Las Minas rivulet and the small ponds formed in the isthmus of the peninsula. Turfs in group I reach the higher size classes of diameter (31 - 45 cm), while in group II they reach only up to 25 cm. Moreover, the population size structure suggests that sites in group I are more established than group II. It is not clear whether sites of group II are begining to colonize the area or if they live under less favorable conditions.

The tussock size structure at different sites showed higher frequencies for the lower classes (Fig. 3). The distribution pattern, in which young tussocks are predominant, suggested that *D. antarctica* is a colonizing species in the Coppermine Peninsula.

Coverage

The coverage by *D. antarctica* at each site ranged from 0.18 % to 1.96 % of the area of sampling sites (Table 2). Most of the coverage is due to mosses (mainly *Drepanocladus uncinatus* Hedw. and *Politrichum alpestre* Hedw.), lichens (mainly *Lecidea* sp., *Psoroma* sp., and *Leptogium puberulum* Hue.), and nitrogen-fixing cyanobacteria *Nostoc* sp.).

The size structure in natural population indicates the state of the population. A large proportion of young tussocks means that this population is in the growth phase and that regeneration is sufficient for further increase. The low total coverture by this species also supports this proposition. Although with regards to size structure of tussocks in different sites, there were two slightly different groups of sites, the total population of *D. antarctica* in Robert Island fits the pattern in which young classes predominate. For this reason, it is likely that *D. antarctica* is in the process of colonization in Robert Island.

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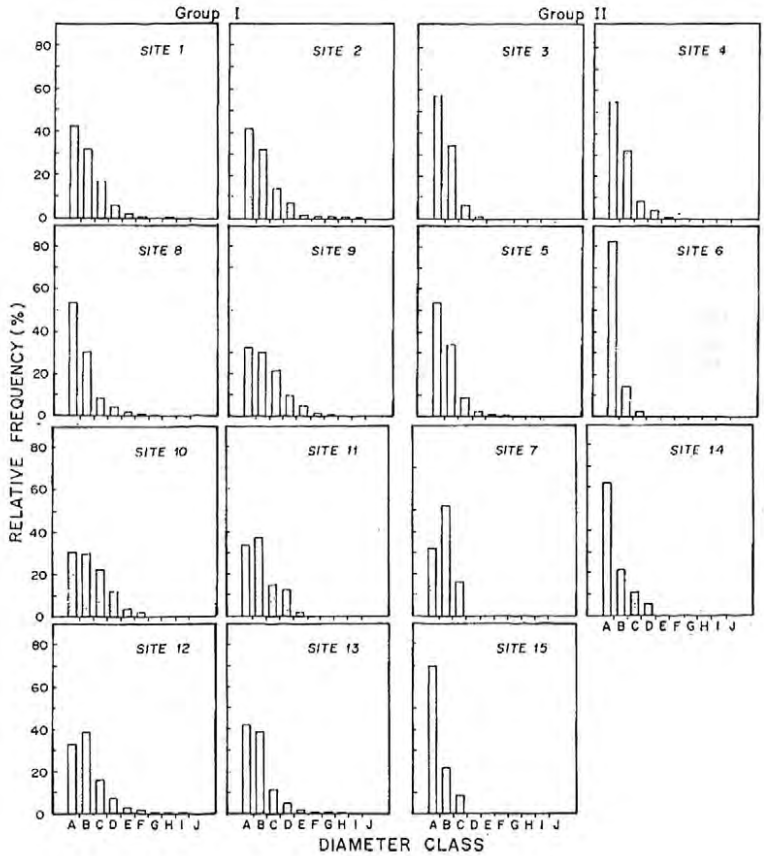

Fig. 3. Size structure for all sites of *Deschampsia antarctica* in the Coppermine Peninsula, Robert Island. Size intervals (cm) were A:0-5; B:6-10; C:11-15; D:16-20; E:21-25; F:26-30; G:31-35; H:36-40 and I:41-45 .

Table 2

COVERTURE BY *DESCHAMPSIA ANTARCTICA* IN DIFFERENT SAMPLING SITES IN THE COPPERMINE PENINSULA, ROBERT ISLAND. SAMPLING SITES AND SIZE CLASSES ARE THE SAME AS DESCRIBED IN FIG. 3. SC = COVERTURE BY *D. ANTARCTICA* IN EACH SITE.

Sampling site	Coverture by each size class (%, x100)										
	A	B	C	D	E	F	G	H	I	J	SC
1	1	9	13	9	5	2	0	4	0	0	43
2	1	9	10	10	3	4	4	3	2	0	46
3	13	62	33	14	0	0	0	0	0	0	112
4	4	21	15	14	2	0	0	0	0	0	56
5	9	49	37	19	9	1	0	0	0	0	124
6	24	38	21	0	0	0	0	0	0	0	83
7	1	9	8	0	0	0	0	0	0	0	18
8	5	25	21	19	13	9	5	0	0	0	97
9	4	29	55	49	40	14	5	0	0	0	196
10	1	8	15	17	8	7	0	0	0	0	56
11	4	40	45	70	18	0	0	0	0	0	177
12	2	19	23	19	13	12	4	3	2	0	97
13	2	14	12	10	5	3	2	0	0	0	48
14	4	13	18	18	0	0	0	0	0	0	53
15	26	73	82	0	0	0	0	0	0	0	181

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