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EVOLUTION OF THE SHOOT DENSITY OF THE *POSIDONIA* SEAGRASS BED OF CALVI BAY (CORSICA)

M. SOULLARD [1,2], *I. BOURGE* [1], *J. FOGEL* [1], *D. LARDINOIS* [1], *T. MATHIEU* [1], *C. VEESCHKENS* [1], *D. BAY* [3], *P. DAUBY* [1] *and J.M. BOUQUEGNEAU* [1]

[1] *Laboratoire d'Océanologie, Université de Liège, B6-Sart Tilman, B-4000 Liège, Belgique*
[2] *Università di Corsica, Faculté des Sciences, Bât. 018, F-20250 Corte, Corse*
[3] *STARESO, BP 33, F-20260 Calvi, Corse*

POSIDONIA OCEANICA
DENSITÉ DE FAISCEAUX

RÉSUMÉ – La densité de faisceaux de *Posidonia oceanica* (L.) Delile a été étudiée dans la baie de Calvi par Bay en 1975 et 1977. Nous avons effectué les mêmes mesures dans le même herbier en 1991. Aucune régression n'a été mise en évidence. Au contraire, nous avons observé une augmentation de la densité des faisceaux à 10 mètres de profondeur.

POSIDONIA OCEANICA
SHOOT DENSITY

ABSTRACT – The density of seagrass shoots in the *Posidonia* bed of Calvi Bay was studied by Bay in 1975 and 1977. The present paper reports the shoot density of the same seagrass bed in 1991. No regression has been observed. On the contrary, an increase of shoot density has been observed at 10 metres depth.

INTRODUCTION

Posidonia oceanica (L.) Delile seagrass beds play an important role in building up and protecting the Mediterranean coast and they provide refuge, habitat and nourishment for many animal and plant species. Since two decades, several authors have noticed the regression of these meadows, which can correspond either to a recession of the whole community (especially in deeper areas) or to a decrease of the shoot density (Peres, 1984), in response to various human activities : urban and industrial sewage, mechanized fishing activities, yachting and dredging, rise of water turbidity, etc.

Between 1975 and 1977, one of us (D.B.) has extensively studied the structure and production of the *Posidonia* meadow in Calvi Bay (Bay, 1978, 1984). Since these works, many scuba diving were performed in that area without any notice of obvious decrease of the surface area of the bed; nevertheless, during the same period a quite complete disappearance of another marine plant, *Cystoseira balearica,* was observed by Hoffmann *et al.* (1988) who hypothesized an eutrophication effect. As no estimation of the *Posidonia* shoot density has been performed since 1977, we thought it was worth making a new estimation in order to follow the evolution of the bed during these last 15 years.

METHODS

In May 1991, we have performed countings on the same sites than those previously studied by Bay (1978), *i.e.* at 10 and 30 metres depth along a transect from the oceanographic station STARESO to the citadel of Calvi (see map on fig. 1, stations 1 and 2). Moreover, countings were also made at a distance of 50 m on both sides of station 1 on the 10 m isobath (stations 1' and ", fig. 1). The countings were performed following the same methodology than Bay's one : a metal circle (30 cm diameter) is randomly thrown down on the bed and the number of included seagrass shoots is recorded by a diver. Most of the countings were performed by three of us (I.B., D.L. & C.V.), and the reliability of their estimations has been tested against Bay's observations : the metal circle has been settled on two sites choosen for their respective low and high shoot density. The shoots have been successively counted by D.B., I.B., D.L. & C.V., afterwhat they were uprooted and counted in the laboratory. The results are shown in Table I A, from which it appears that the difference between the observations of respectively D.B., and the other three divers does not exceed ten percent of the average value. The observations are very accurate in less dense areas, but they are underesti-

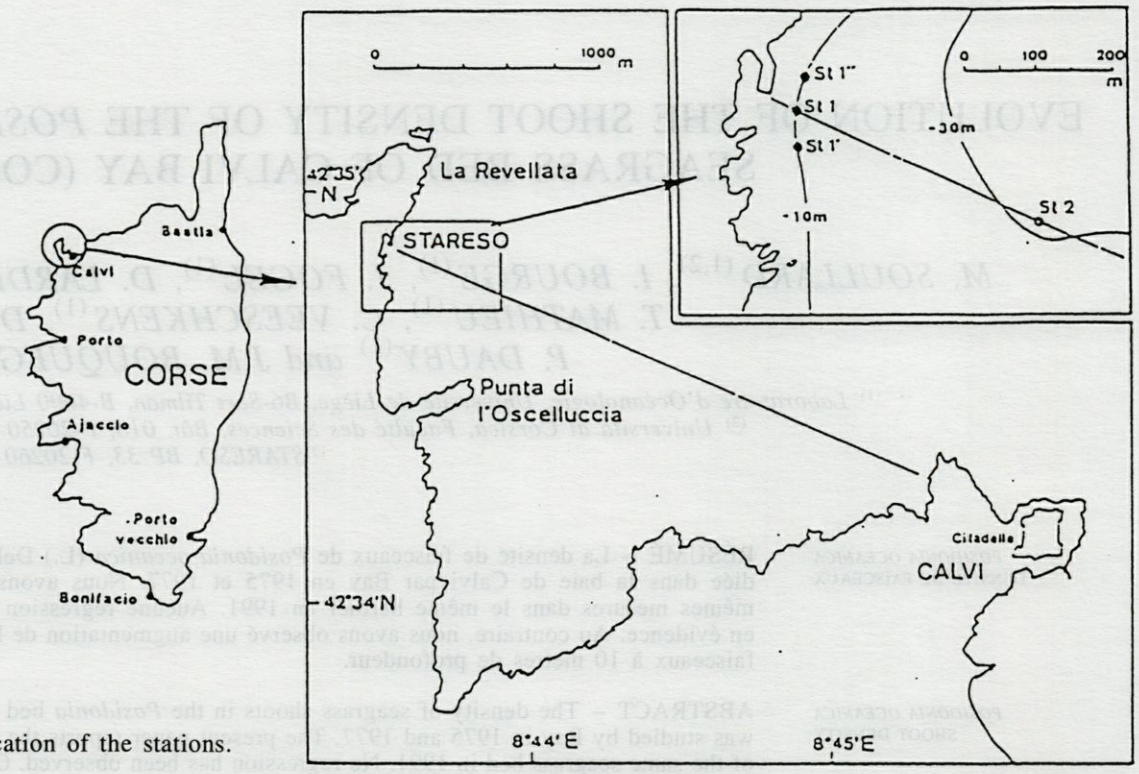

Fig. 1. – Location of the stations.

Table I. – A, Comparison between the shoot density estimations made by four different divers. B, Mean shoot number per m^2 at 10 m depth (May 1991). Location of the stations : see Fig. 1. n = number of counts ; m = mean density ; S.D. = standard deviation. C, Time variation of the shoot number per m^2 at 10 m depth. D, time variation of the shoot number per m^2 at 30 m depth.

A

Real number of shoots	Estimation by D.B	Estimation by I.B	Estimation by D.L.	Estimation by C.V.
20	18	21	20	19
46	41	42	41	40

B

Station	n	m	S.D.	P (t-test)	P(t-test)
1	32	500	142	0,935	
1'	32	503	150		0,060
1"	32	434	134	0,057	
1+1'+1"	96	481	143		

C

Year	n	m	S.D.	P(t-test)	P(t-test)	Ref.
1975	104	407	239	0,982		BAY,1984
1977	32	408	156		0,009	BAY,1984
1991	96	481	143	0,016		This work

D

Year	n	m	S.D.	P(t-test)	P(t-test)	Ref.
1975	39	223	95	0,039		BAY, 84
1977	32	174	101		0,010	BAY, 84
1991	32	168	75	0,788		This work

mated in most dense ones. However, that underestimation never exceeds 12 % of the actual value.

RESULTS AND DISCUSSION

Tables I B and C are presenting the results of the countings performed at 10 metres depth. The three sampled stations are quite similar even if station 1" is somewhat less dense that the order two ones (Table I B). Nevertheless, obtained values are 20 % higher than those recorded by Bay in 1975 and 1977 (Table I C).

On the contrary, the results obtained for 30 metres depth (Table I D) reveal a significant change in shoot density at that depth when comparing them with those of 1977. This observation suggests that these variations could be the result of a year-to-year variation of the activity of the meadow instead of the result of a long-term one.

From the statistical treatment of our results, we are tempted to conclude that the general trend of the seagrass bed of Calvi Bay, at 10 m depth, is a continuing increase at the shoot density point of view. Indeed, 15 years ago, the meadow was balancing between scattered and dense status, according to the classification of Giraud (1977 – "herbier clairsemé et dense"), but now it must be considered as a true dense one. However, it has been recently shown that the branching rate of the *Posidonia* shoots is high, implying a potential high turnover rate, with a mean two years virtual life span of the shoots (Boudouresque, personal communication). So the following questions arise, what is the actual signification of such an increase in the shoot density ? Is it the consequence of a continuous increase of the density of the shoots, or is this observation to be considered as an accidental one, resulting from both an unusual high branching rate and a low mortality rate of the shoots during the two previous years ? A continuing scheme of shoot density evaluations is planned for the next years to try and answer that question.

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