Evaluation of *Posidonia oceanica* Primary Production using Lepidochronological Analysis : preliminary results

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When *Posidonia oceanica* (L.) Delile leaves die, only the blade falls away, the sheatting base remains attached to the rhizome and is then called a "scale" (PERGENT, 1987; PERGENT et al., 1989). These scales shown cyclic variations in their thickness and anatomy along the rhizome, each cycle corresponds to a one year period. The study of these chronological cycles is termed **lepidochronology** (PERGENT, 1987).

The presence of morphometrical correlations between scale and blade parameters (MOSSE, 1985; PERGENT, 1987) makes it of interest to test the possibility of establishing a method to give rough estimates of primary production based upon lepidochronological data. A method of this kind should be much less time consuming than classic methods (e.g. ^{14}C, ZIEMAN's leaf marking).

A study is actually in progress in three sites around Ischia Island (gulf of Napoly). The objective of this work is to make a comparison between results obtained by lepidochronological analysis and by the leaf marking method.

The length of blades which have lived above a given scale (sheating base) is established using the significant correlation existing between leaf length (L) and sheath lenght (SH) (MOSSE, 1985; PERGENT, 1987). In this way, a linear regression is determined, using phenological data, for each site L = f(SH).

The leaf density (weight par surface unit) shows variations according to age and birth period (THELIN et GIORGI, 1985). The parameter to be taken into consideration is final density, just before shedding. The mean leaf density is measured over a one year period.

By using the leaf renewal cycle, determined by lepidochronology, it is possible to identify the number and length scales formed during a given period of the year (PERGENT, 1987; PERGENT and PERGENT-MARTINI, in press).

For a given year and shoot, it is possible to evaluate the primary production of leaves from the following parameters :

N = mean number of leaves formed during a one year period.
SC = mean length of scales during a one year period.
L = mean length of previous leaves (L = f(SC)).
D = mean aged leaf density.

In addition, rhizome production, which is generally low (3% of total production in PERGENT, 1987), can be determined by weighting the rhizome section corresponding to the determinate one year period.

For leaf production (PL), the formula is : $PL = N \times L \times D$

The leaf primary production is evaluate in three sites of Ischia island (Tab. I).

	Mean Depth (m)	Number of leaves per year	Scale length SC (mm)	Regression line L = f(SH)	Leaf length L (mm)	Leaf density D (mg/cm)	Leaf production (g dw/shoot)	Shoot density (m²)	Leaf production (g dw/m²)
Site LA05	-5	7.1	39.9	y=30.6x-794	426.7	4.9	**1.48**	473	**702.2**
Site LA10	-10	5.3	41.9	y=21.2x-466	422.2	4.5	**1.01**	351	**353.4**
Site LA20	-20	6.6	40.7	y=16.2x-323	336.0	4.1	**0.91**	253	**230.1**

Table I : Evaluation of primary production (in g dry weigth per shoot and per m^2) in Ischia, using lepidochronological analysis.

Our results are consistant with the values obtained in previous works using leaf marking method :

- In the same site (Ischia, -4 m depth) WITTMANN and OTT (1982) found a net leaf production of 1.2 g dry weight per shoot (our results are 1.48 g dry weight per shoot), and WITTMANN (1984) found a net leaf production of 667 g dry weight per m^2 (our results are 702 g dry weight per m^2).
- In Port-Cros Bay, France (-1 to -2 m depth), THELIN and GIORGI (1984) found a net leaf production ranges from 1.2 and 1.8 g dry weight per shoot.

Evaluation of primary production from lepidochronological data appears to be a feasible target. It should be possible to evaluate very quickly primary production of *Posidonia oceanica* meadow in a given site and perhaps to follow its variation over a given period of time (previous years).

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