

PRELIMINARY DATA ON THE PRODUCTION OF *POSIDONIA OCEANICA* AND OF ITS EPIPHYTES IN THE BAY OF PORT-CROS (VAR, FRANCE).

Maurice LIBES^{° °°}, Ch.F. BOUDOURESQUE[°] & M.R. PLANTE-CUNY^{°°}

[°] Laboratoire d'écologie du Benthos et de Biologie végétale marine,
Faculté des Sciences de Luminy, route Lachamp, 13288 Marseille cedex 9.
^{°°} Station Marine d'Endoume, centre d'oceanographie, rue batterie des Lions
13007 Marseille.

RESUME: La production primaire de *Posidonia oceanica* et de ses épiphytes a été mesurée *in situ* par la méthode du carbone 14. Des phénomènes de saturation et d'inhibition de la photosynthèse sont mis en évidence en Juin et en Juillet. Les valeurs de production vont de 1,4 gC.m⁻².d⁻¹ en Novembre à 6,5 gC.m⁻².d⁻¹ en Juin pour *P.oceanica*, et de 0,3 gC.m⁻².d⁻¹ à 2,5 gC.m⁻².d⁻¹ pour les espèces épiphytes.
Une extrapolation provisoire de nos résultats aboutit à une valeur de production annuelle de 1300 gC.m⁻². soit 3,5 kg poids sec.m⁻².a⁻¹, dont 27% reviennent aux épiphytes.

INTRODUCTION: The marine phanerogam contribution to primary production in littoral zones has been mostly studied on *Thalassia testudinum* Banks ex König and *Zostera marina* Linnaeus. Publications concerning leaf epiphytes production are uncommon (Penhale 1977, Capone *et al.* 1979). Only the following works concerning *Posidonia oceanica* (Linnaeus) Delile, mention production data: Drew and Jupp (1976), Bay (1978), Ott (1980), and Cristiani (1980); epiphyte production was not studied.

MATERIEL AND METHODS: The experiment site is located in a dense meadow, at a depth of 2.5 m. At each experiment conducted, a 4 liter plexiglas container (Wetzel 1964) with a stirring device attached (Bay 1978), is placed onto a leaf shoot of *P. oceanica*

At the start of the experiment, 2ml of a NaH¹⁴CO₃ solution (20 µCi.ml⁻¹), are injected in the container.

After 2 hours of incubation, the *P.oceanica* is collected, rinsed and immediately quick-frozen.

Then at the laboratory, the epiphytes are scraped off both sides of the leaves with a razor blade. After lyophilisation, the leaves and epiphytes are weighed and combusted in a Packard TriCarb B 306 oxidizer. The "c.p.m" data obtained by measuring ¹⁴C present in our samples using liquid scintillation techniques, are then converted into fixed mgC (Vollenweider 1974). All experiments were undertaken each month from March 1981 through July 1982. The results given here as an example, concern several daily cycles only, carried out in March, May, June, July and November.

RESULTS: Light effect on *Posidonia oceanica* productivity and that of its epiphytes follows the usual pattern: a first phase where productivity increases proportionally with light intensity is followed by a phase where productivity reaches a maximum value due to "saturating" light action (May, Fig.A) In two cases (June, July), a photoinhibition was observed for light energy values higher than 750-850 µE.m⁻².s⁻¹ (Fig.a).

Posidonia oceanica and its epiphytes production both increase slightly between November and March: from 1.5 to 1.9 gC.m⁻².d⁻¹ for the first, and from 0.4 to 0.7 gC.m⁻².d⁻¹ for the second.

At springtime, in May and June, production rate is higher: 5 and 6.5 $\text{gC.m}^{-2}.\text{d}^{-1}$ for *P.oceanica* versus 2.4 and 2.5 $\text{gC.m}^{-2}.\text{d}^{-1}$ for the phanerogam epiphytes. This increase seems to be due, on the first hand to *P.oceanica* own internal growth rhythm (Ott1979), which is materialized by a leaf area increase as from the month of March, and on the other hand to a seasonal light energy increase. In July, production decreases: 2.8 $\text{gC.m}^{-2}.\text{d}^{-1}$ for *P.oceanica* and 0.9 $\text{gC.m}^{-2}.\text{d}^{-1}$ for its epiphytes.

This decrease seems to be due to important light energy existing at this particular season, which leads to photosynthetic inhibition during the greater part of the day. Capone *et al.* (1979) have observed such photo-inhibition in *Thalassia testudinum*.

If epiphyte production is lesser than *P.oceanica*'s, on the other hand, productivity is twice greater (Fig.a).

During the year, both *P.oceanica* and its epiphytes production and productivity cycles evolve in a similar way. This similarity may prove to indicate close interactions between leaves and epiphytes.(Fig.a).

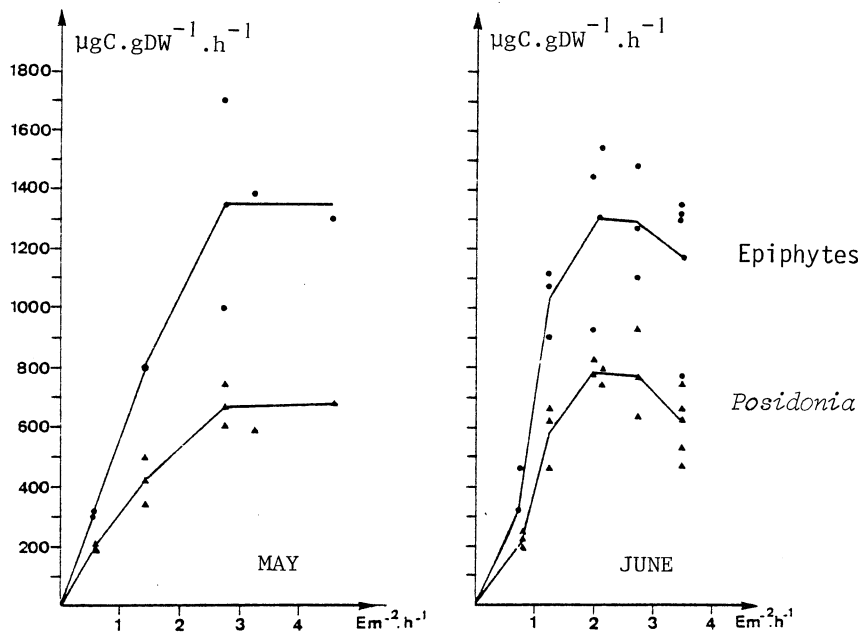


Fig.A: Photosynthesis light curves for *P.oceanica* and its epiphytes.

Temporary extrapolation of partial data gives a production rate of 1300 $\text{gC.m}^{-2}.\text{a}^{-1}$ ($3500\text{g.dw.m}^{-2}.\text{a}^{-1}$), 27% of it being due to epiphyte activity. This production rate, which confirms data from Ott(1980) obtained at Ischia (Italy) at a depth of 4m ($3100\text{gdw.m}^{-2}.\text{a}^{-1}$) is quite high and if confirmed by further results, will lead us to conclude that the *P.oceanica* seagrass meadows are one of the most productive ecosystems in the marine environment.

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