

PHOTOSYNTHATE TRANSFER IN POSIDONIA OCEANICA (MARINE PHANEROGAM)

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RESUME: Après 6h d'incubation à la lumière et 6h de post-incubation à l'obscurité, 21,4% des photosynthétats marqués se retrouvent en dehors du faisceau qui a incubé: 8,0% dans les rhizomes, 1,0% dans les racines, 7,0% dans les feuilles des faisceaux voisins, et 5,4% dans leurs épiphytes. La plus grande partie de ces photosynthétats correspond à un transfert à longue distance à partir du faisceau marqué. Ceci met en évidence l'importance du système conducteur chez *P. oceanica*, et la redistribution des photosynthétats entre les faisceaux.

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INTRODUCTION: The problem of photosynthates transfer in marine phanerogams has been studied essentially on *Zostera marina* Linnaeus and *Zostera americana* Den Hartog by Harrisson (1978), on *Thalassia testudinum* Banks ex König and *Halodule wrightii* Ascherson by Wetzel and Penhale (1979), and on *Z. marina* and *Phyllospadix scouleri* Hooker by Harlin (1973). At the present time, only the phosphorus transfer has been studied on *Posidonia oceanica* (Linnaeus) Delile by Fresi and Saggiomo (1981).

MATERIEL AND METHODS: The study was carried out at a site located in the bay of Port-Cros (Var, France), at a depth of 3m. During the experiment, a transparent and watertight plexiglas cylinder containing a stirring system (Bay 1978) was placed onto a leaf shoot left *in situ*.

At the start of the experiment, 2ml of a $\text{NaH}^{14}\text{CO}_3$ solution ($20 \mu\text{Ci.ml}^{-1}$) are injected in the cylinder.

- After 2 to 6 hours of incubation (the latter case in order to obtain a maximal carbon incorporation), the cylinder is removed along with the labelled sea water, leaving the leaf shoot in place. The shoot is left *in situ* for 6 to 24h more, in order to allow translocation. From this point on, this last step will be referred to as the "post-incubation phase".

- At the end of the post-incubation phase, the whole plant system is collected (rhizome, roots and adjoining leaf shoots) and is immediately quick-frozen. Then at the laboratory, the samples are separated into their different components: leaves, epiphytes, rhizomes and roots are lyophilised, weighed and the radioactivity measured using liquid scintillation techniques after combustion in a Packard TriCarb B 306 oxidizer.

RESULTS: The incubated shoot: after a short incubation period (2h) the labelled photosynthates are mostly located in the middle leaf section. After a longer incubation time (6h), followed by a 24h post-incubation phase, the labelled photosynthates have been transferred to the leaf sheath (non photosynthetic meristematic basal part).

The rhizome: The presence of gradually increasing radioactivity across the rhizome clearly indicates photosynthate transfer (Fig.a). The transfer is sometimes predominant towards the rear of the plagiotropic rhizome, sometimes towards the apex.

The roots: The amount of transferred photosynthates is not as important as in other parts of the plant. Labelled carbon is essentially located in roots beneath the incubated shoot.

The adjacent shoots(belonging to the same rhizome system): labelled photosynthates are found in the leaves(which have not undergone incubation) and also in their epiphytes. These photosynthates do not follow a random distribution. A Friedman rank test shows that the amount of photosynthates is significantly higher in leaves 2 and 3(numbered from the youngest)than in others. Data collected from an experiment conducted in May 1981 show that the incorporated and translocated carbon is distributed as follows:

Total uptake: 1570 μgC

- incubated shoot: leaves....965 μgC (61.5%)
epiphytes.270 μgC (17.1%)
- rhizome.....125 μgC (8.0%)
- roots..... 15 μgC (1.0%)
- adjacent shoots: leaves....110 μgC (7.0%)
epiphytes. 85 μgC (5.4%)

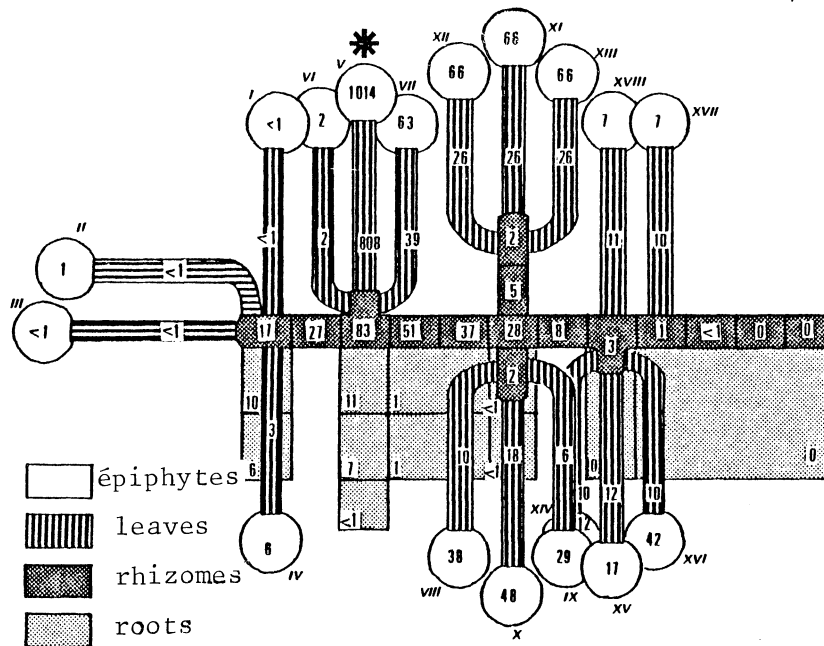


Fig.a: Distribution of incorporated carbon in shoots, rhizomes, roots and epiphytes in $\mu\text{gC.g dry weight}^{-1}$. The asterisk points out the incubated shoot.

In other experiments, the carbon transfer was less important. Nevertheless it seems clear that a part of new photosynthates are transferred from leaves to rhizomes, and then redistributed to other shoots or roots. This brings to light the conspicuous role of *P.oceanica* vascular tissues and the existence of interrelations, on the first hand between adjacent shoots of a same rhizome system, and on the other hand between the leaves and their epiphytes.

références

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