Methodological aspects and first results of the study of decomposition of *Phragmites australis* Trin. in the coastal wetland "Albufera de Mallorca" (Spain)

J. XAMENA*, M. RAMON*, LL. PONS* and E. DESCALS**

*Laboratori de Ecologia, Universitat de les Illes Balears, Campus de la UIB, PALMA DE MALLORCA (España)
**Consejo Superior de Investigaciones Cientificas, Institut d'Estudis Avançats, PALMA DE MALLORCA (España)

Aspects of decomposition of *Phragmites* have been experimentally studied in the Albufera de Mallorca. The objectives were twofold: to determine the effect of different shapes and mesh size of containers on decomposition rates of leaves and culms. Secondly, to carry out parallel studies on fungal colonization of the decomposing fractions.

The Albufera de Mallorca has a surface area of 24 Km2. The temperature range for water in lagoons is 10 to 29°C. The salinity in these lagoons in the different areas is very variable and depends mainly on drainage rates in the rainy seasons (MARTINEZ, 1988).

In December 1990 standing dead leaves and culms were collected and stored air dry. In March 1991 they were cut into portions and triplicate random samples were put in 2 mm mesh bags (6.6 g) and 5 mm mesh cages (7-10 g dry wt). Leaves were recovered after 32 and 92 days, and culms after 121 and 211 days.

In the laboratory samples were grossly blended and sampled for mycological studies, and the dry weight of the remaining matter determined.

Results

A. Weight loss.

The loss of leaf biomass in bags after 32 days was half that of the cages. After 92 days incubation differences are not so significant (63% and 71.2% respectively) (Table 1).

	Cummulative days	mesh-size (mm)	loss weight	decomposition rate (in %).
leaf	32	2	0.73±0.09	0.343
	32	5	1.39±0.29	0.659
	92	2	3.99±0.10	0.548
	92	5	4.72±0.18	0.835
culms	32	2	2.66±0.32	0.188
	32	5	2.58±0.16	0.209
	92	2	3.51±0.16	0.087
	92	5	3.85±0.10	0.087

Table 1- Decomposition of *Phragmites* leaves and culms

Differences in loss of culm biomass were not so great between bags and cages. The values obtained at 121 and 211 days incubation are very similar.

POLUNIN (1982) stated that 80% of the weight loss of *Phragmites* leaf biomass in the first 20 days is due to leaching. This allows us to presume that the 2 mm mesh may interfere more significantly than that of 5 mm in this process.

Table 2 shows the instantaneous decomposition rate (K) calculated according to the exponential model of OLSON (1963). The decomposition values obtained for either leaves or culms in both types of container are very similar. Differences are not important in the final results. But there is a great difference between K values for leaves and culms. These differences are clearly shown for half decomposition times (T 1/2). In contrast to our results, MASON & BRYANT (1975) and ANDERSON (1978), using 4 and 0.25 mm mesh bags, obtain values for half decomposition times of 7-11 months. These marked discrepancies are probably mainly due to the difference in temperatures, as their studies were carried out in England (52° lat.).

	Cummulative days	mesh-size (mm)	loss weight	Kx100	T1/2
leaf	92	2	60.31	1.3	53.32
	92	5	71.22	1.7	40.77
culms	211	2	30.71	0.119	581.0
	211	5	33.04	0.121	574.8

Table 2.- Decomposition of *Phragmites* leaves and culms. K= coefficient of regression. T 1/2 = time of semi-decomposition

B. Preliminary mycological observations.

Plant tissue was surface sterilized with bleach and subdivided into two portions. One was moist-incubated at 15°C in sterile Petri dishes under NUV to induce fruiting, and the other was cut into small portions (approx. 2mm square) using sterile technique for pure culture. These were immersed in antibacterial isolation media, the resulting colonies being transferred individually onto 2% malt extract agar or *Phragmites* leaf agar. After incubation at room temperature, or at 15°C with or without NUV, sporulating or fruiting colonies were examined microscopically, and the remaining were submerged for two or more days in autoclaved Albufera or distilled water in Petri dishes under the same conditions, to induce sporulation of aquatic states.

Species determinations are underway, but it may be concluded at this stage that practically the entire plant biomass of both leaves and culms appeared to be colonized by microfungi, and that these belonged to very few species, (a probable case of saprophytic spacialization) mainly to presumably terrestrial lepto-sphaeriaceous ascomycetes and pycnidial coelomycetes (often fruiting at the bottom of the plates), with only some hyphomycetes. Submerged incubation of cultures proved unsuccessful, but that of *Phragmites* culm fragments yielded numerous conidia of a dematiaceous scolecosporous aquatic hyphomycete (in the genus *Anguillospora)* which is apparently new to science. Many isolates remained sterile, probably due to inadequate sporulation conditions, and this problem is now being looked into.

REFERENCES

MARTINEZ A., 1988.- *Caracteristiques limnologiques de s'Albufera de Mallorca.* Universitat de les Illes Balears. Tesi doctoral 708 pp.

MASON & BRYANT, 1975.- Production, nutrient content and decomposition of *Phragmites communis* TRIN. and *Typha angustifolia* L. *J. Ecol.* 63 71-95.

OLSON J.S., 1963.- Energy storage and the balance of producers and decomposers in ecological systems. *Ecology* 44(2): 322-331.

POLUNIN, 1982.- Processes contributing to the decay of reed *(Phragmites australis)* litter in fresh water. *Arch. Hydrobiol.* 94, 182-209.