

# How does endophytic fungi transform the *Posidonia oceanica* (L.) Delile (1813) meadow into the aegagropiles?

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## 1. Introduction

The aegagropiles are:

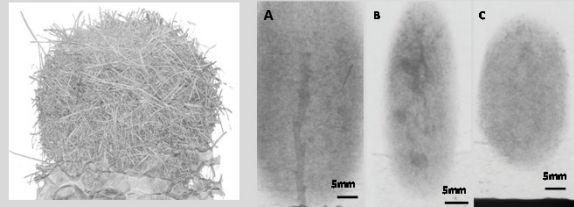
- Found along the Mediterranean beaches
- Sized in mm to cm
- Shaped spherical to ellipsoid
- Agglomerate of seagrass "fibres" (*P. oceanica*)



## 2. $\mu$ CT scan observation

The organisation of *P. oceanica* aegagropiles:

Morphotype with a rhizomic's nucleus (A), heterogeneous cluster of fibres (hypothesis: partially degraded rhizome fragment) and homogeneous morphotype (C) (hypothesis: the final degradation of the piece of stem).

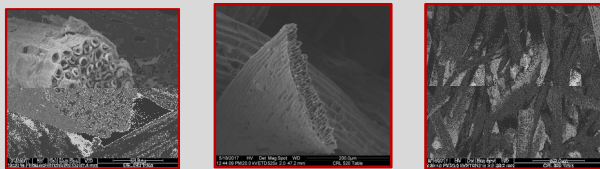


## 3. Microscopic observation

### 3.1 Isolated fibre characterization

3 fibres types as seen in SE-SEM and on stained semi-thin sections (resin-embedded)

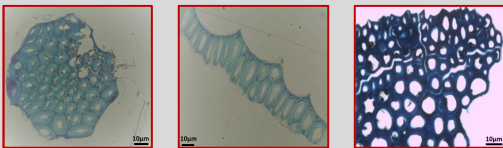
Thin fibre (F.T.)      Intermediate fibre (F.I.)      Wide fibre (F.W.)



F.T.

F.I.

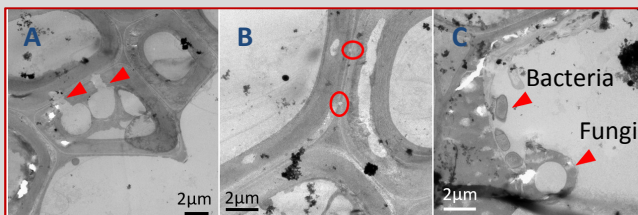
F.W.



### 3.2 Biotic degradation

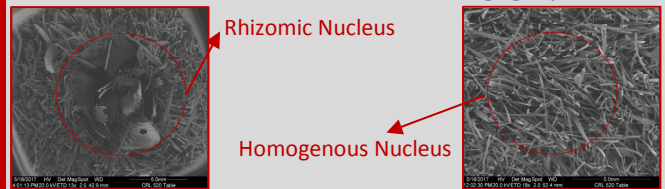
TEM views of ultra-thin sections

Perforations in the cell walls & degradation of the PCW middle lamella (A, B), Hyphae of black septate fungi (C) (Ascomycete, Aigialaceae).

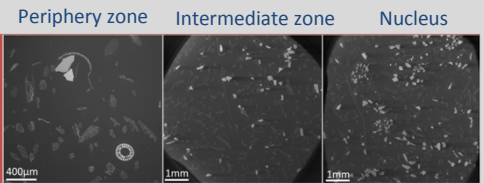


### 3.3 Internal architecture

SE-SEM views of freeze-fractured aegagropiles

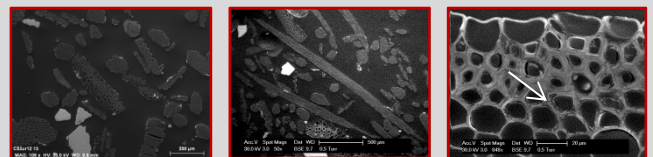


BSE-LV-SEM of polished bloc faces of resin-embedded whole aegagropiles (contrast by gadolinium acetate)



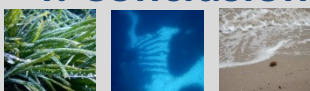
→ density increases from the periphery to the center  
Fibre orientation & characterization on polished bloc faces

(uranyl acetate contrast in BSE-LV-SEM, 0.4-0.6 Torr)



Fibre cross-section shapes depending on orientation, PCW details and microbial degradation revealed (→)

## 4. Conclusion



The present study illustrates the origin and the internal constitution of aegagropiles:

- Coming from the *Posidonia oceanica* meadows;
- Composed of fibres of plant and sand particles ;
- The result of the biological (fungal) degradation;
- Formed by hydrodynamism (several hypothetical steps).

## 5. Acknowledgement

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