

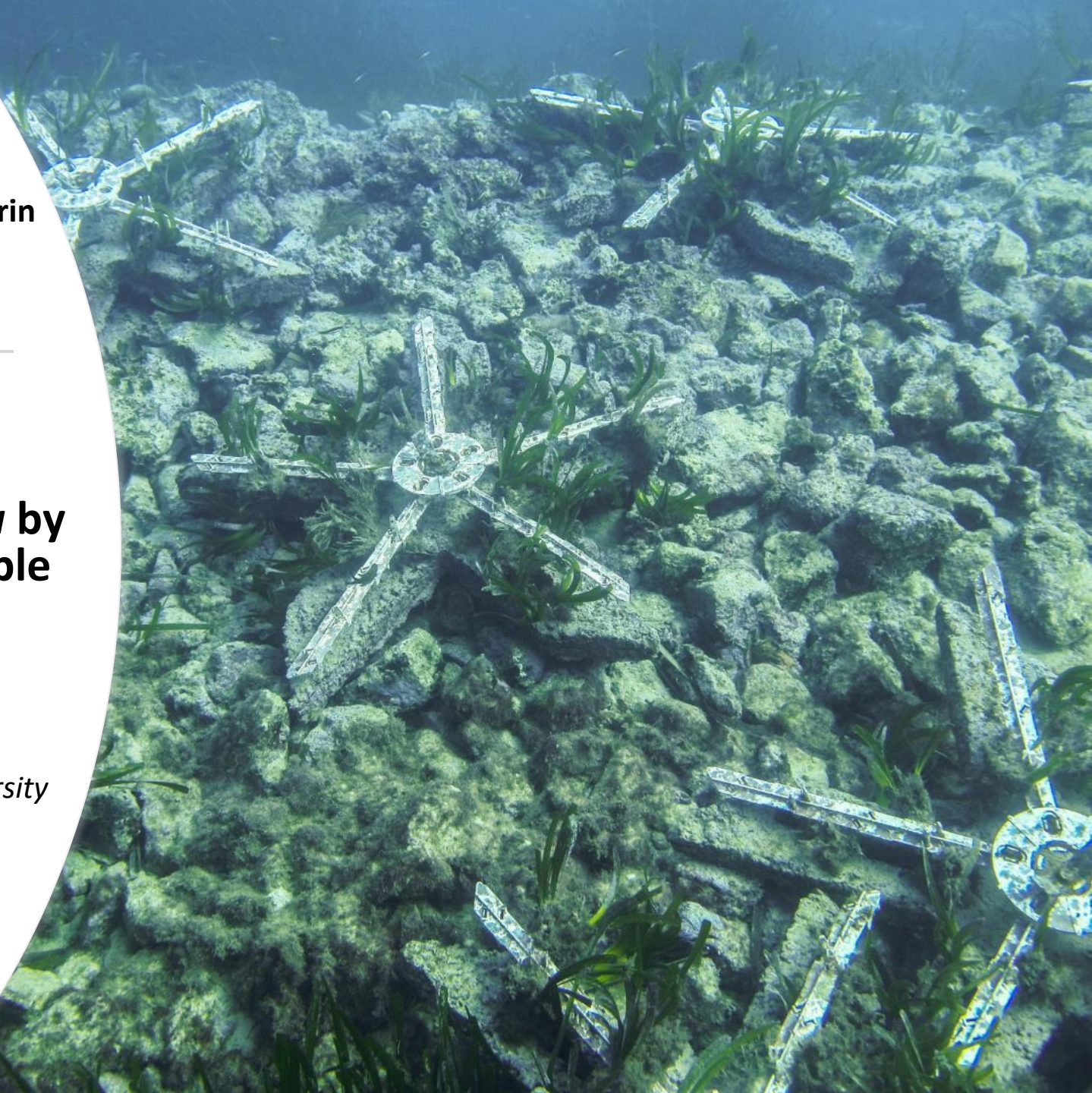
Renforcement des puits de Carbone en milieu marin
Séminaire RenforC - 26 Avril 2021

**Transplanting *Posidonia oceanica* by
means of a modular biodegradable
anchoring system**

Sebastiano Calvo

Biosurvey S.r.l.: academic spin-off at Palermo University

www.biosurvey.it



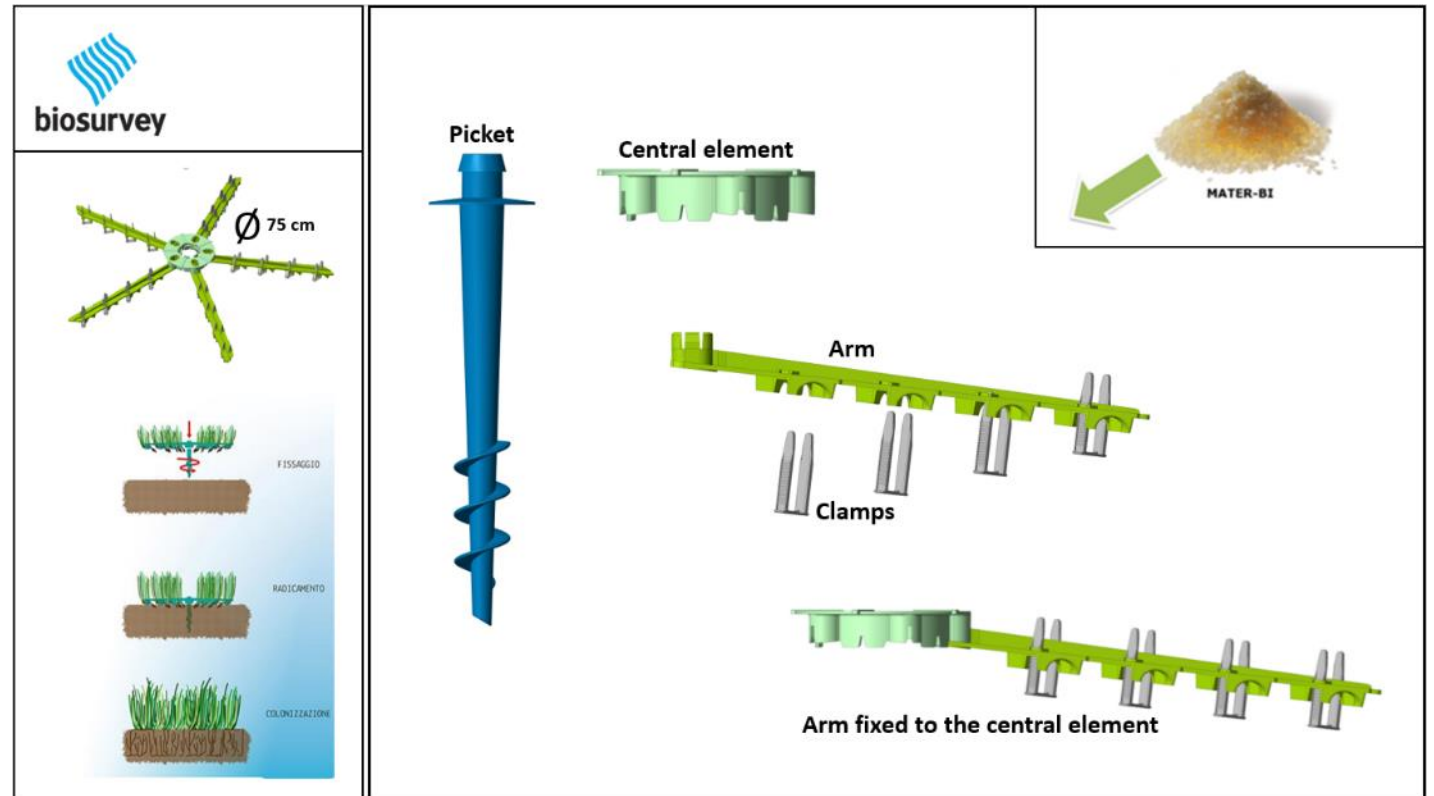
Summary

1. The modular bioplastic anchoring system
2. Methods of transplantation
3. Study cases

The Modular Bioplastic Anchoring System (Mater-Bi®)

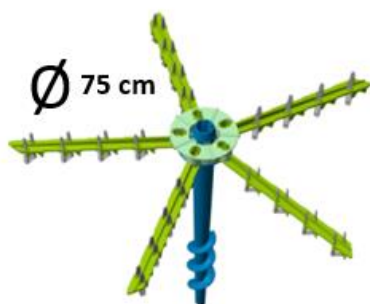
Third-generation Mater-Bi products are innovative bioplastic materials based on starch and biodegradable polyesters derived from vegetable oils, with intrinsic biodegradability and absence of toxic effects (Campani *et al.*, 2020. *Front. Mar. Sci.*).

The connections of the components are bayonet type

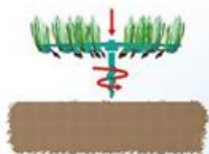


Patents:

- European Design No.: 003000686-0001 of 25/02/2016
- Italian patent for industrial invention No.: 0001400800 of 02.07.2013
- Italian patent for industrial invention No.: 102015000081824 of 30/05/2018

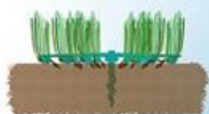


Fixing



FISSAGGIO

Rooting



RADICAMENTO

Colonization



COLONIZZAZIONE

MAIN FEATURES OF BIOPLASTIC ANCHORING SYSTEM

TOTAL BIODEGRADABILITY

The anchoring module is totally biodegradable and compostable

MADE OF BIO-INSPIRED GEOMETRIES

The natural colonization pattern of *Posidonia oceanica* is emulated, because the cuttings are locked to the arms at a 42-degree angle

PLACED ON DIFFERENT TIPOLOGIES OF SEABED

Sand, dead matte and also on hard bottom (artificial reefs and rubbles covering a trench)

DIFFERENT ARRANGEMENT ON SEABED

The anchoring module can be placed in rows or patches

REDUCTION OF UNDERWATER ACTIVITIES

Posidonia oceanica cuttings are fixed to the arms on shore

COST REDUCTION

Placement of *Posidonia oceanica* cuttings is simplified and made faster

- Arrangement of anchor modules in rows and patches

- Patch unit emulate the natural restoration of the meadow.
- The patch arrangement covers a larger area of seabed using the same number of anchoring modules.
- Cuttings sampling from the donor meadow is lower (about 25% less).



Transplant process engineered

Sampling of cuttings



Planting of cuttings together anchor module

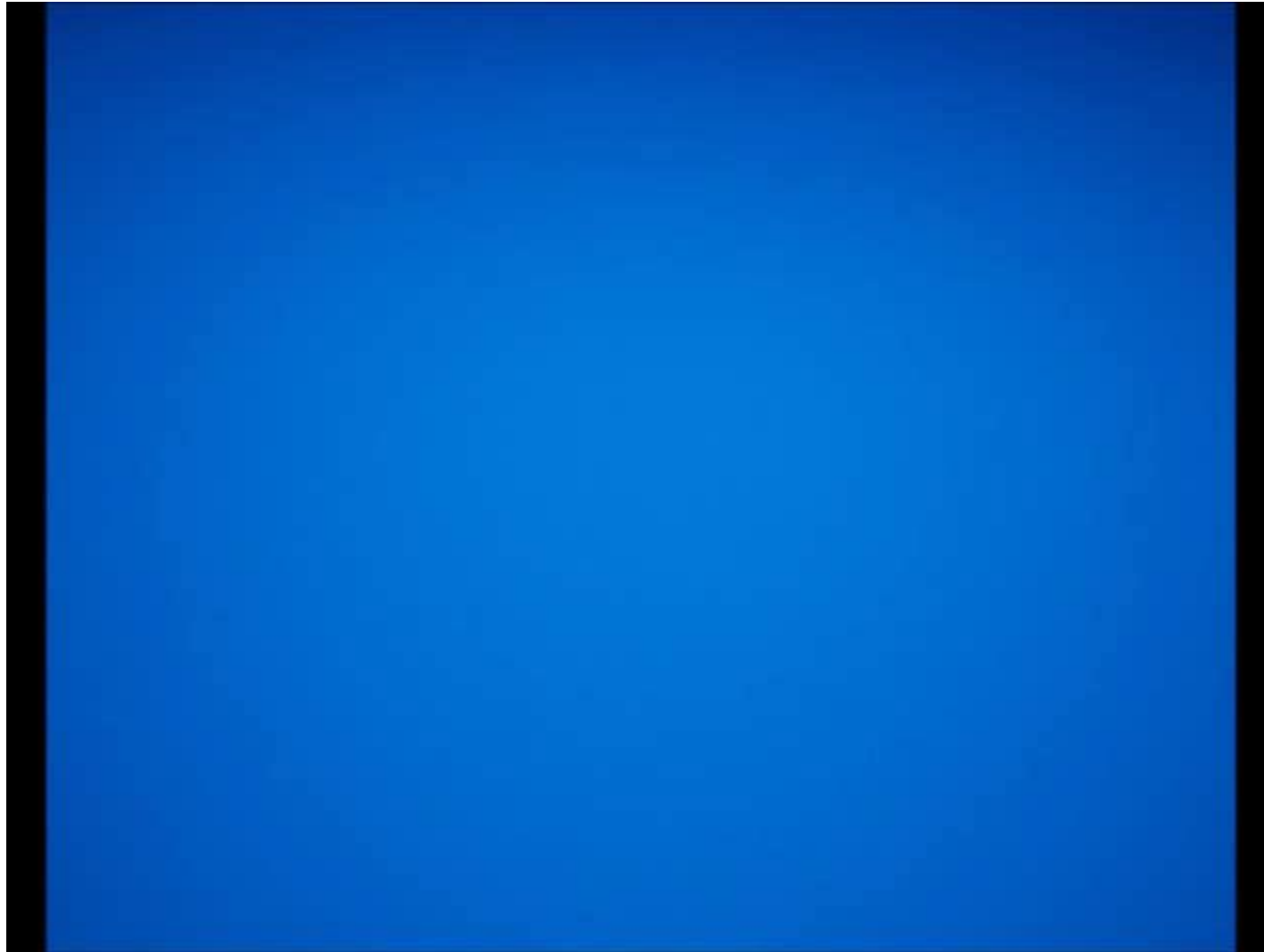


Assembly of cuttings to anchoring modules on shore



- Optimise work
- Reduce costs

How cuttings are fixed on seabed



Capo Feto: south-western Sicily

Trench containing Italian-Algerian
TRANSMED gas pipeline from
Tunisia to Sicily

- Study case

<https://bluegrowth-place.eu/>



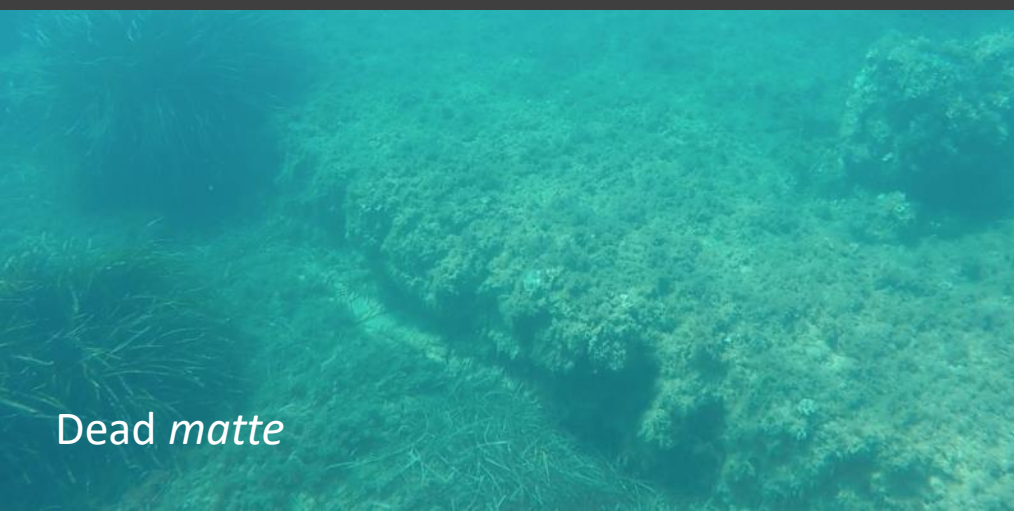
*About 80 ha of seabed altered by pipeline laying activities (realized about 40 years ago),
potentially suitable for hosting pilot reforestation plants of *Posidonia oceanica**



Sand on stones and rubbles



Stones and rubbles covering the trench



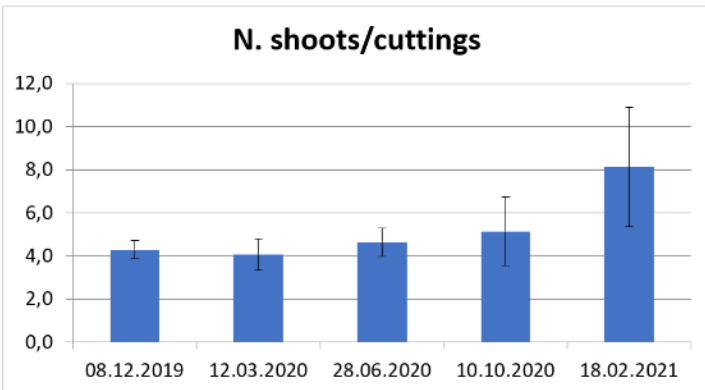
Dead *matte*

Study case: Capo Feto (Southwest coast of Sicily)

<https://bluegrowth-place.eu/>

- PON ARS01_00891 – PLaCE: Capo Feto (Mazara del Vallo)

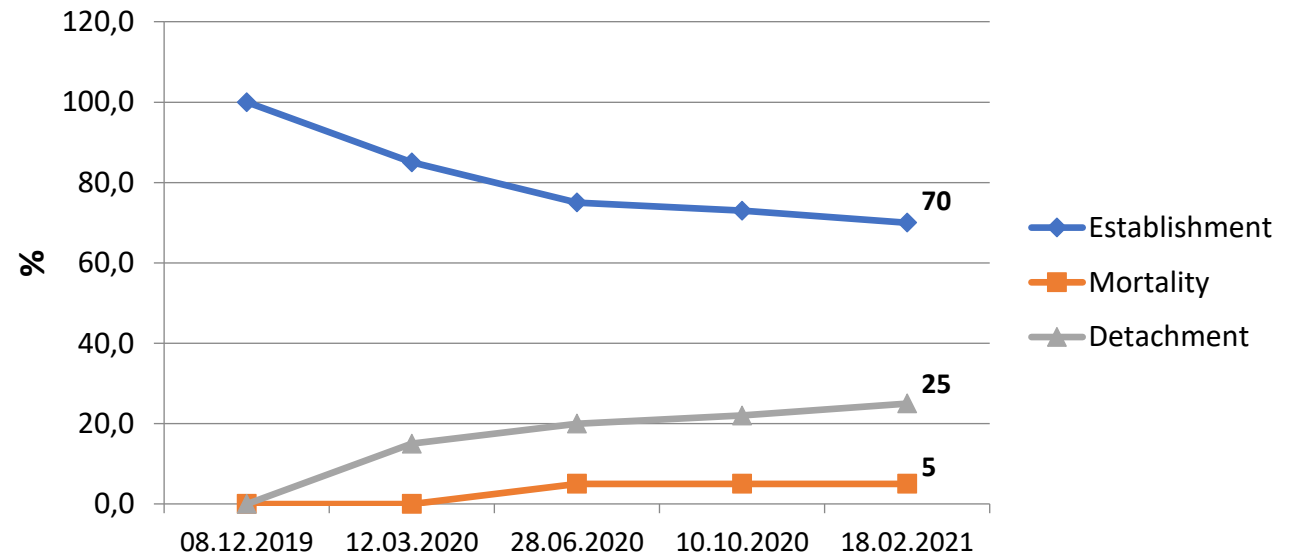
Posidonia transplant on dead *matte* (-7 m)
December 2019 – February 2021



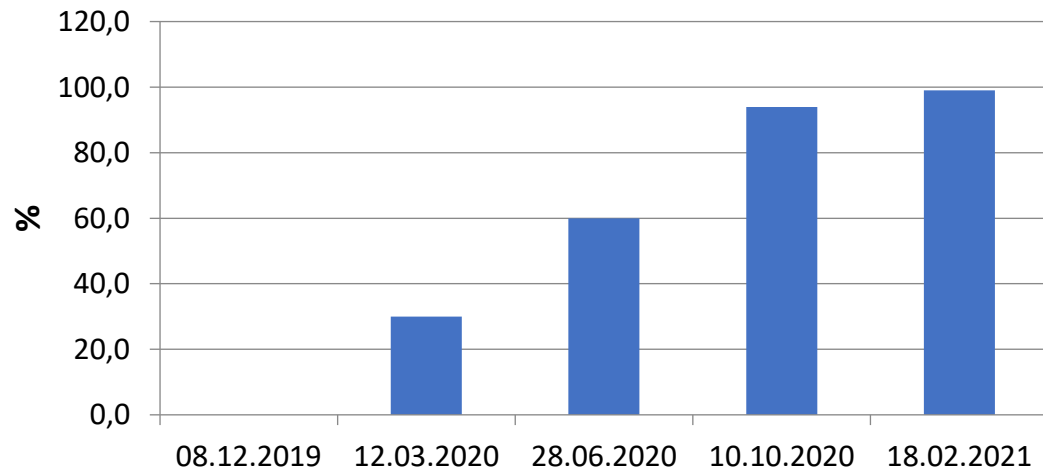


Capo Feto (Southwest coast of Sicily)

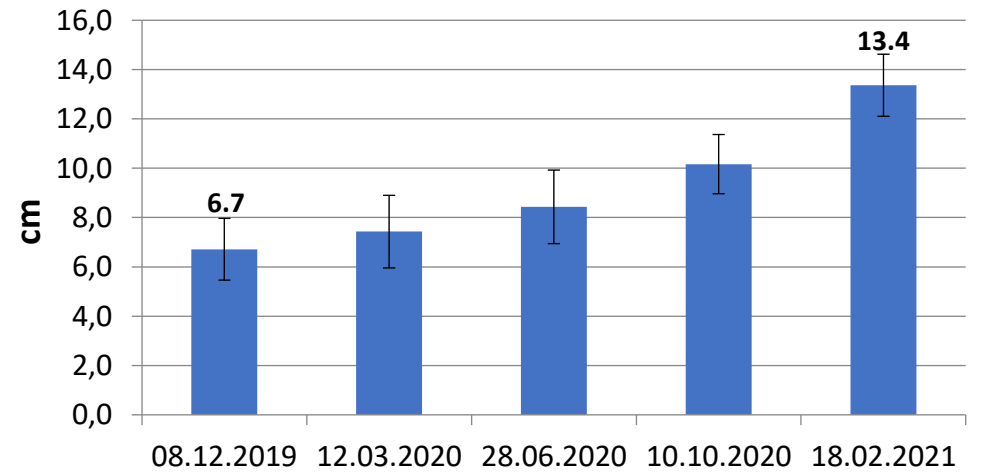
Posidonia transplant on dead *matte* (-7 m)

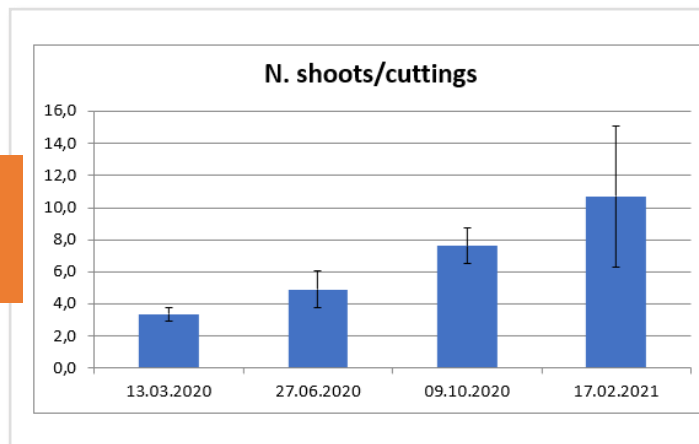
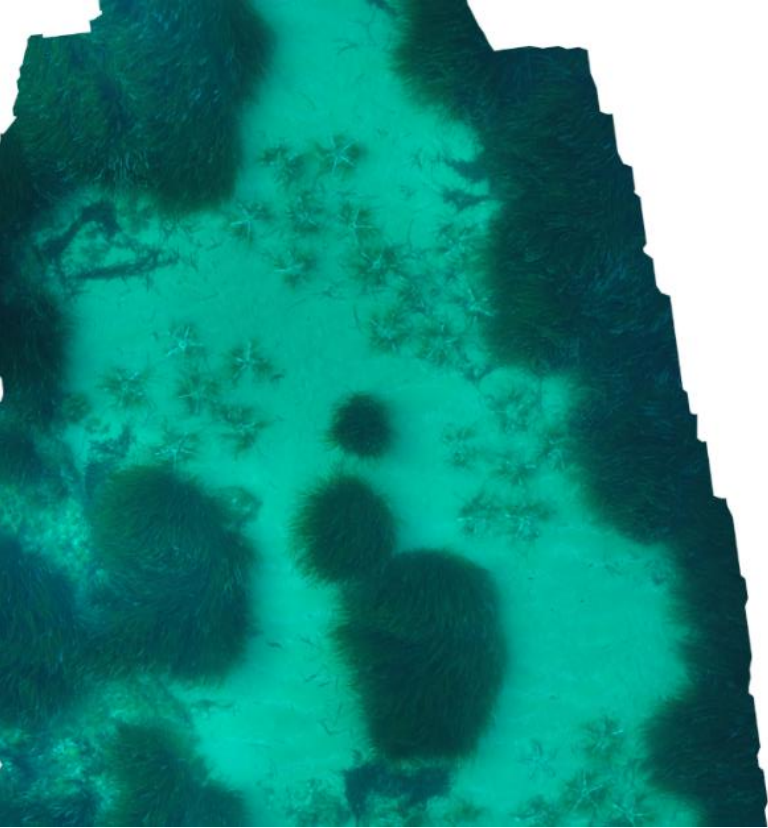


Rooting



Rhizome length





- **PON ARS01_00891 – PLaCE: Capo Feto (Mazara del Vallo)**

Posidonia transplant on sand covering stones and rubbles (-10 m)
March 2020 – February 2021

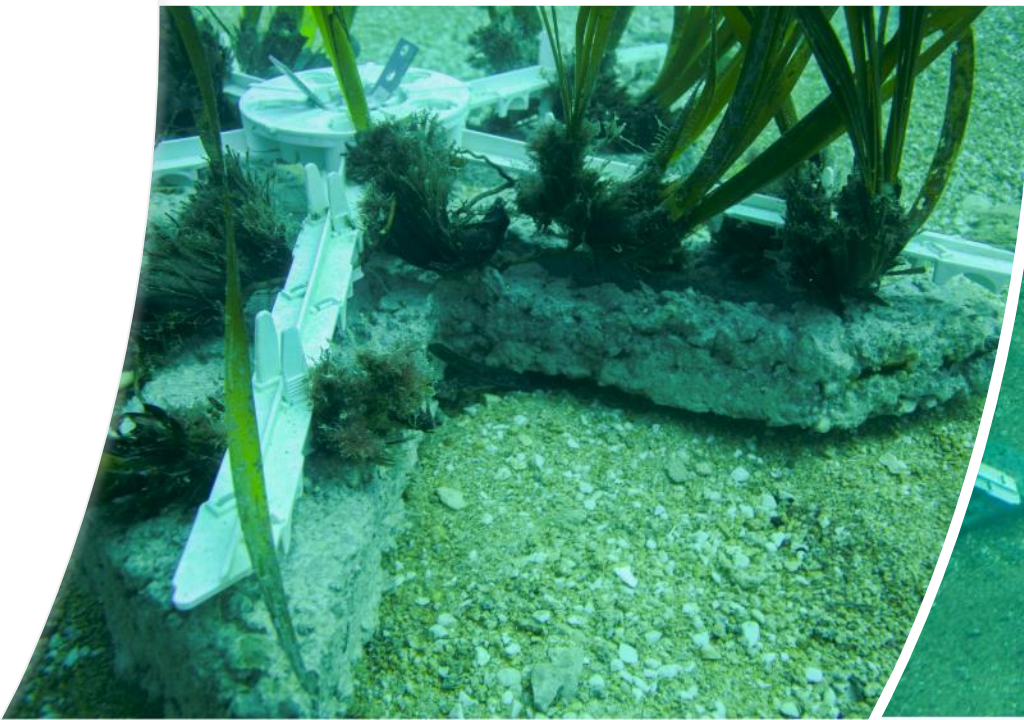


- **PON ARS01_00891 – PLaCE:
Capo Feto (Mazara del Vallo)**

- Posidonia transplant on sand covering stones and rubbles (-10 m)
- March 2020 – February 2021



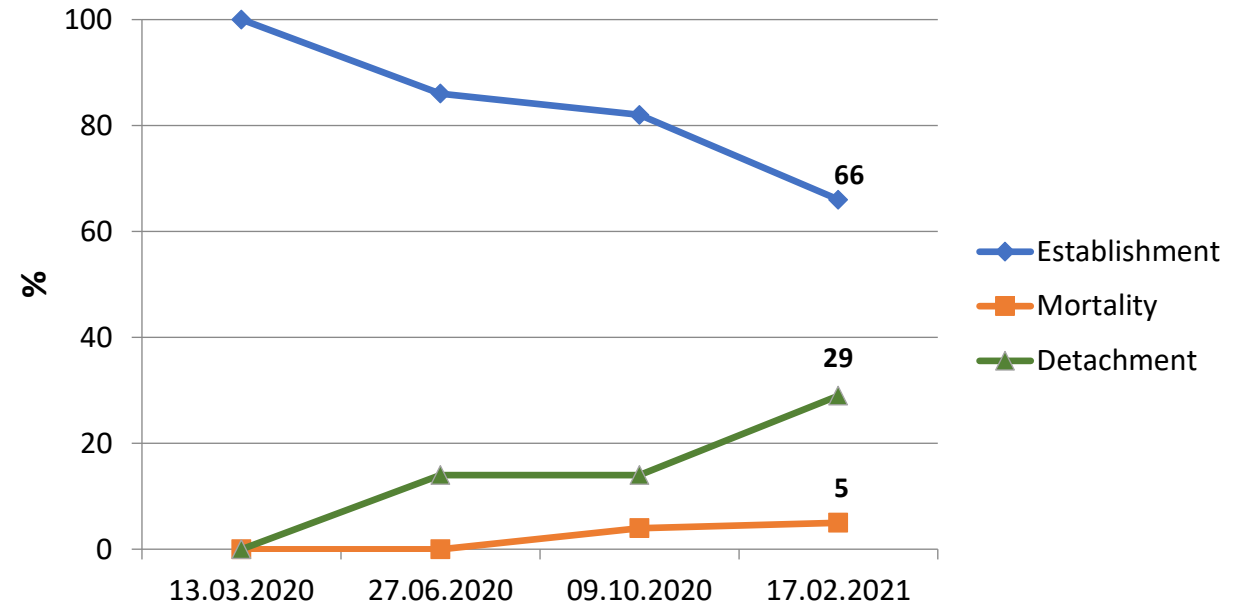
reinforced concrete support



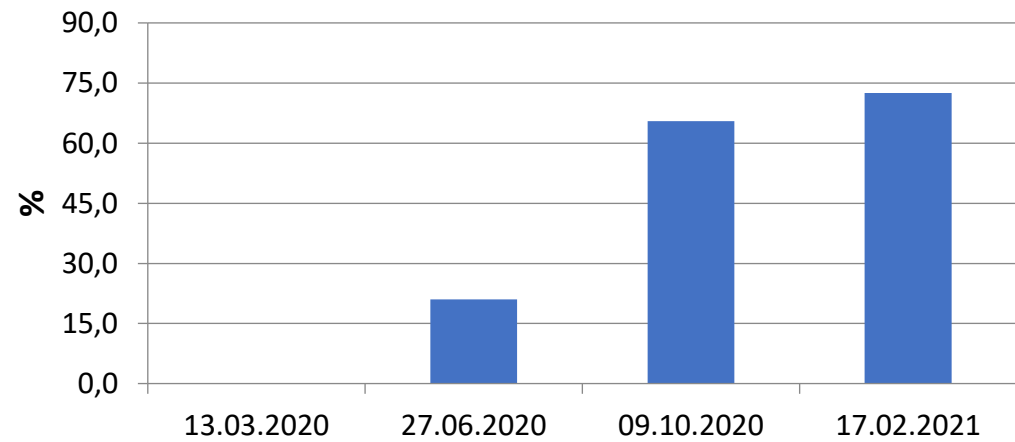


Capo Feto (Southwest coast of Sicily)

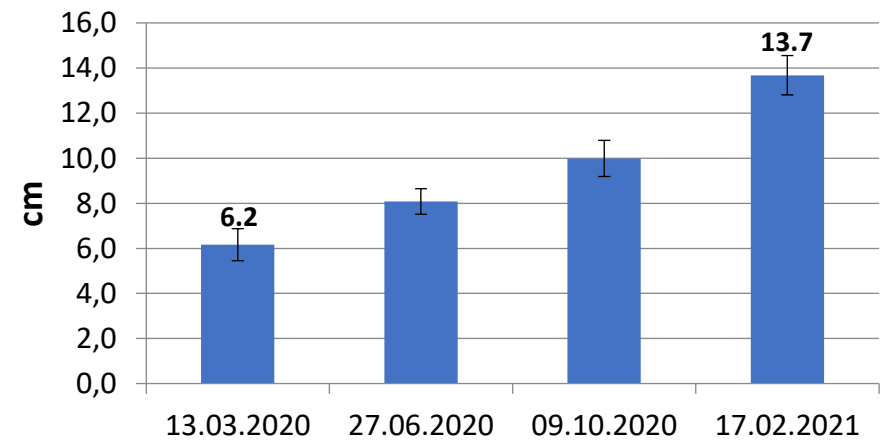
Posidonia transplant on sand (-10 m)

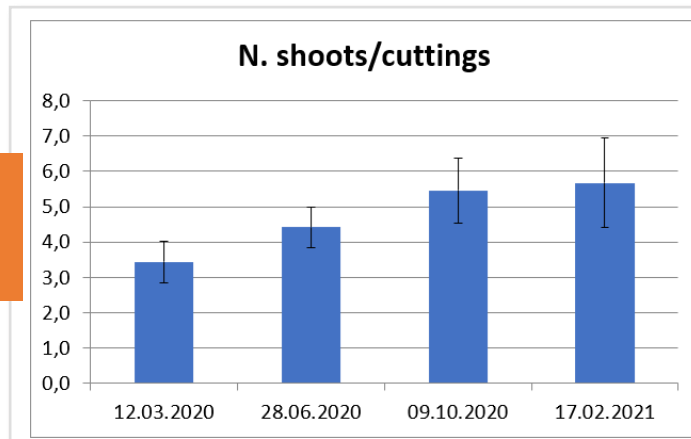


Rooting



Rhizome length





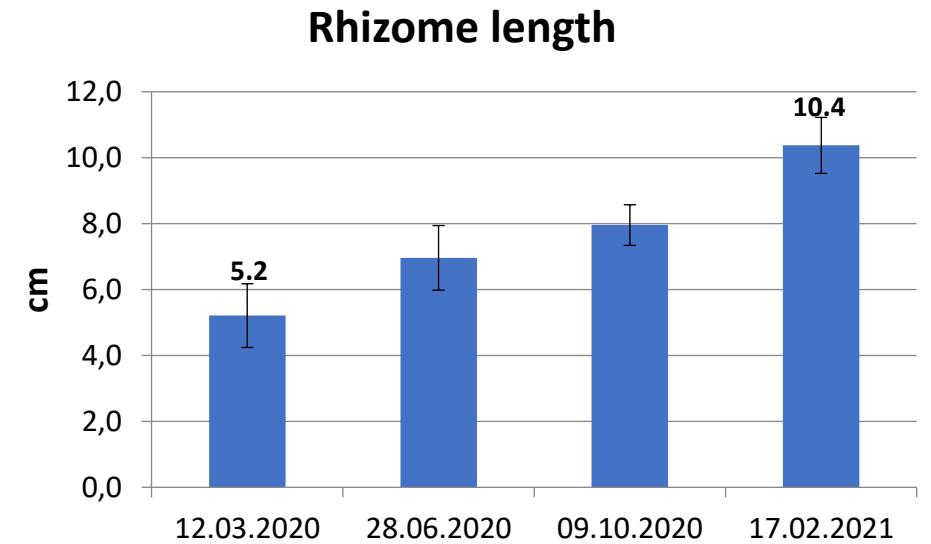
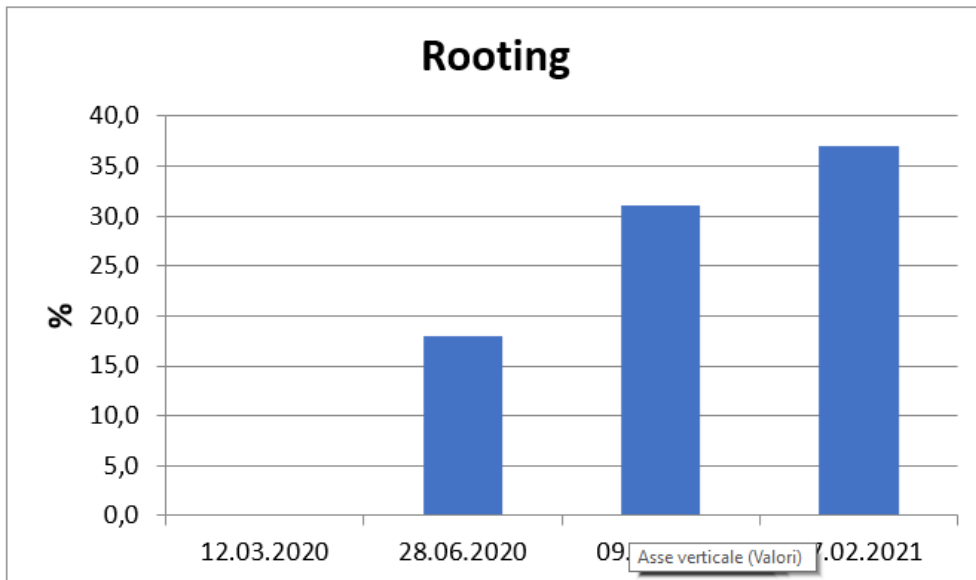
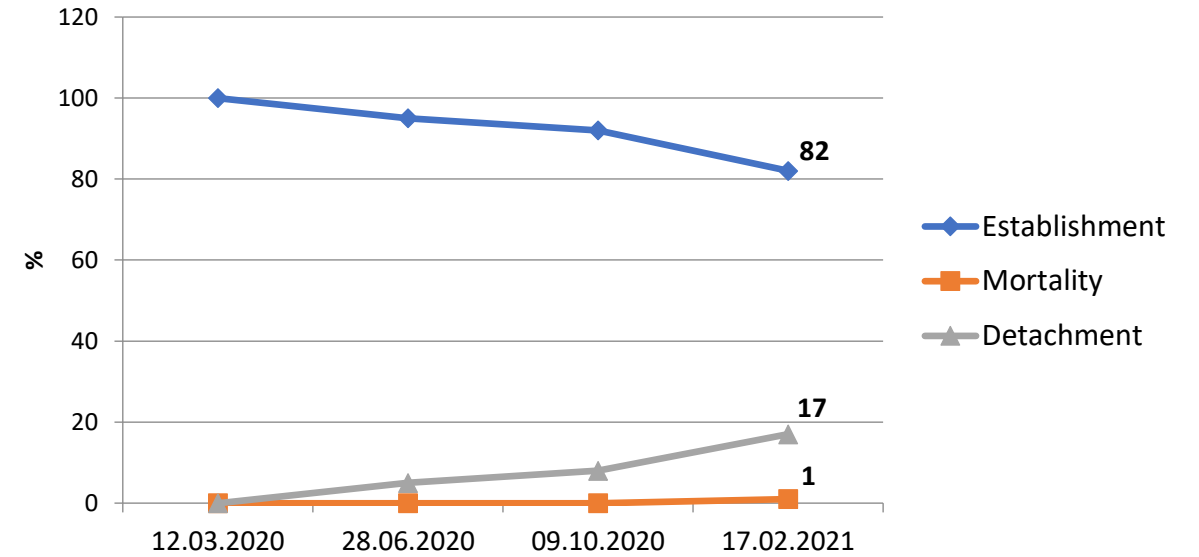
- **PON ARS01_00891 – PLaCE: Capo Feto (Mazara del Vallo)**
- **Posidonia transplant on stones and rubbles (-10 m) *March 2020 – February 2021***



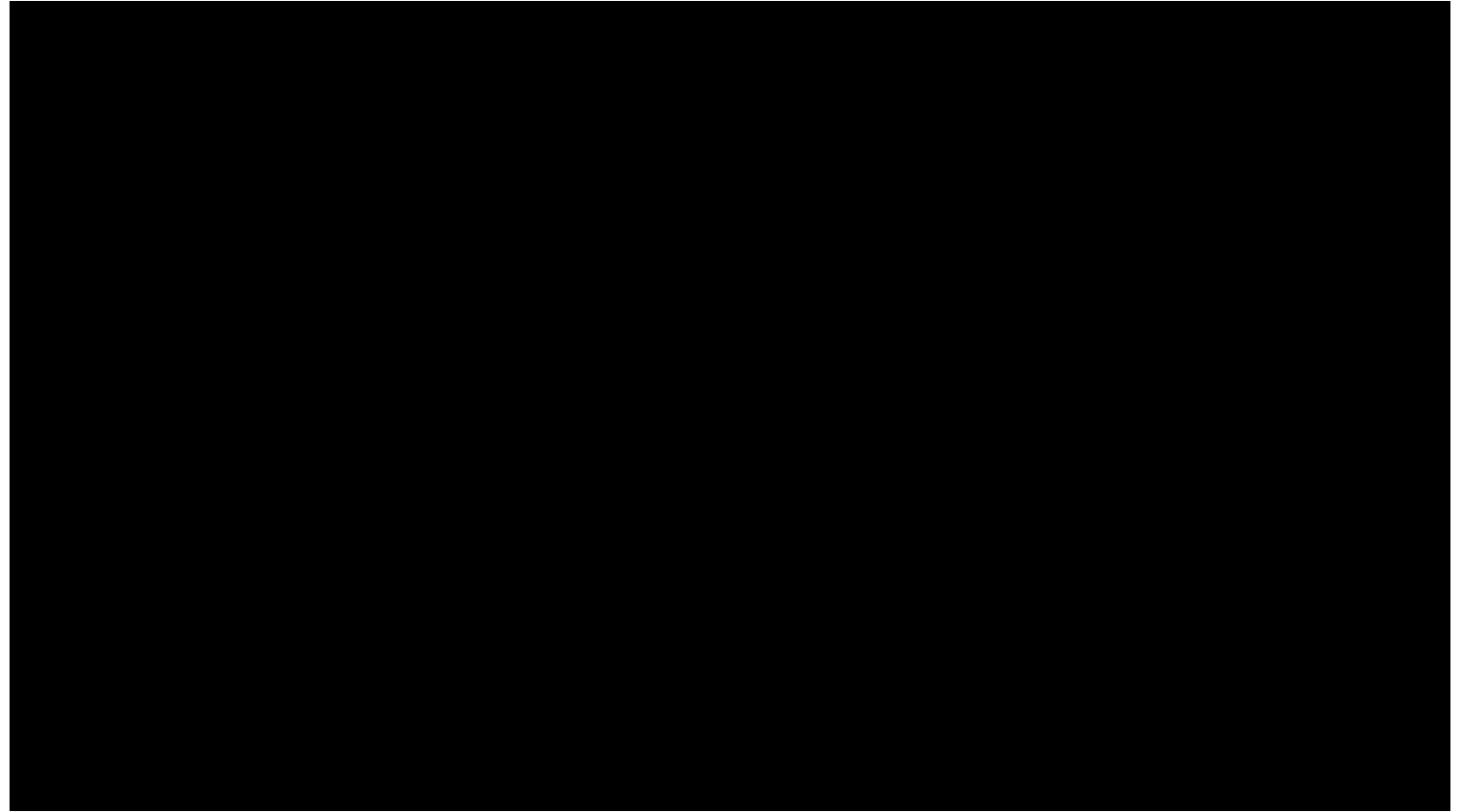


Capo Feto (Southwest coast of Sicily)

Posidonia transplant on stones and rubbles covering the trench (-10 m)



Capo Feto:
Pilot plants
12-14
months after
transplanting





*Thank you for your
attention*