



Universidad Austral de Chile
Conocimiento y Naturaleza

"Cultivo, Repoblamiento y manejo de macroalgas de importancia comercial."

Dr. Renato Westermeier H.

Metri, Octubre 2022



Aporte al desarrollo ficológico desde la UACH

Cultivo

- *Gracilaria chilensis*
- *Sarcothalia crispata*
- *Gigartina skottsbergii*
- *Macrocystis*
 - *Morfo pyrifera*
 - *Morfo integrifolia*
- *Lessonia trabeculata*
- *Lessonia nigrescens*
- *Porphyra spp*
- *Durvillaea antarctica*

Manejo

- *Gracilaria chilensis*
- *Sarcothalia crispata*
- *Gigartina skottsbergii*
- *Mazzaella laminarioides*
- *Macrocystis*
 - *Morfo integrifolia*
- *Lessonia nigrescens*
- *Lessonia trabeculata*

Repoblamiento

- *Gracilaria chilensis*
- *Macrocystis*
 - *Morfo integrifolia*
- *Lessonia nigrescens*
- *Lessonia trabeculata*

Región de Atacama

Estación Bahía Inglesa, Caldera



Planta Lechahua, Ancud



Laboratorio de Macroalgas, Puerto Montt



Est. Experimental de Botánica
Marina Maullin

Estación Yaldad, Quellón.



Región de Los Lagos

Importancia de las algas

```
graph LR; A[Importancia de las algas] --- B[Rol ecológico]; A --- C[Rol económico]; A --- D[Rol social]; E[→] --- F[Gigartina Skottsbergii]; E --- G[Sarcothalia crispata]; E --- H[Gracilaria chilensis]; E --- I[Durvillaea antarctica]; E --- J[Porphyra spp.]; E --- K[Macrocystis spp.]; E --- L[Lessonia spp.];
```

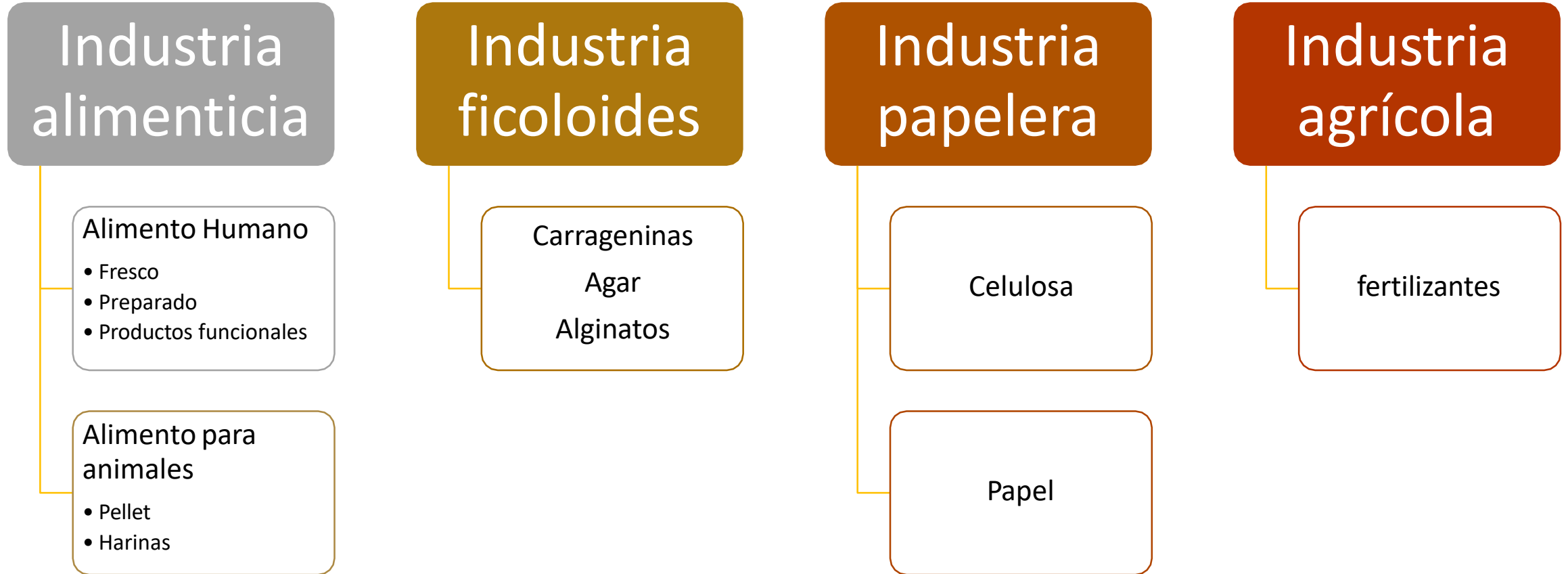
Rol ecológico

Rol económico

Rol social

- *Gigartina Skottsbergii*
- *Sarcothalia crispata*
- *Gracilaria chilensis*
- *Durvillaea antarctica*
- *Porphyra* spp.
- *Macrocystis* spp.
- *Lessonia* spp.

Uso de las algas



Producción de energía

Biocombustible
Biogases
Bioalcoholes

Industria cosmetológica

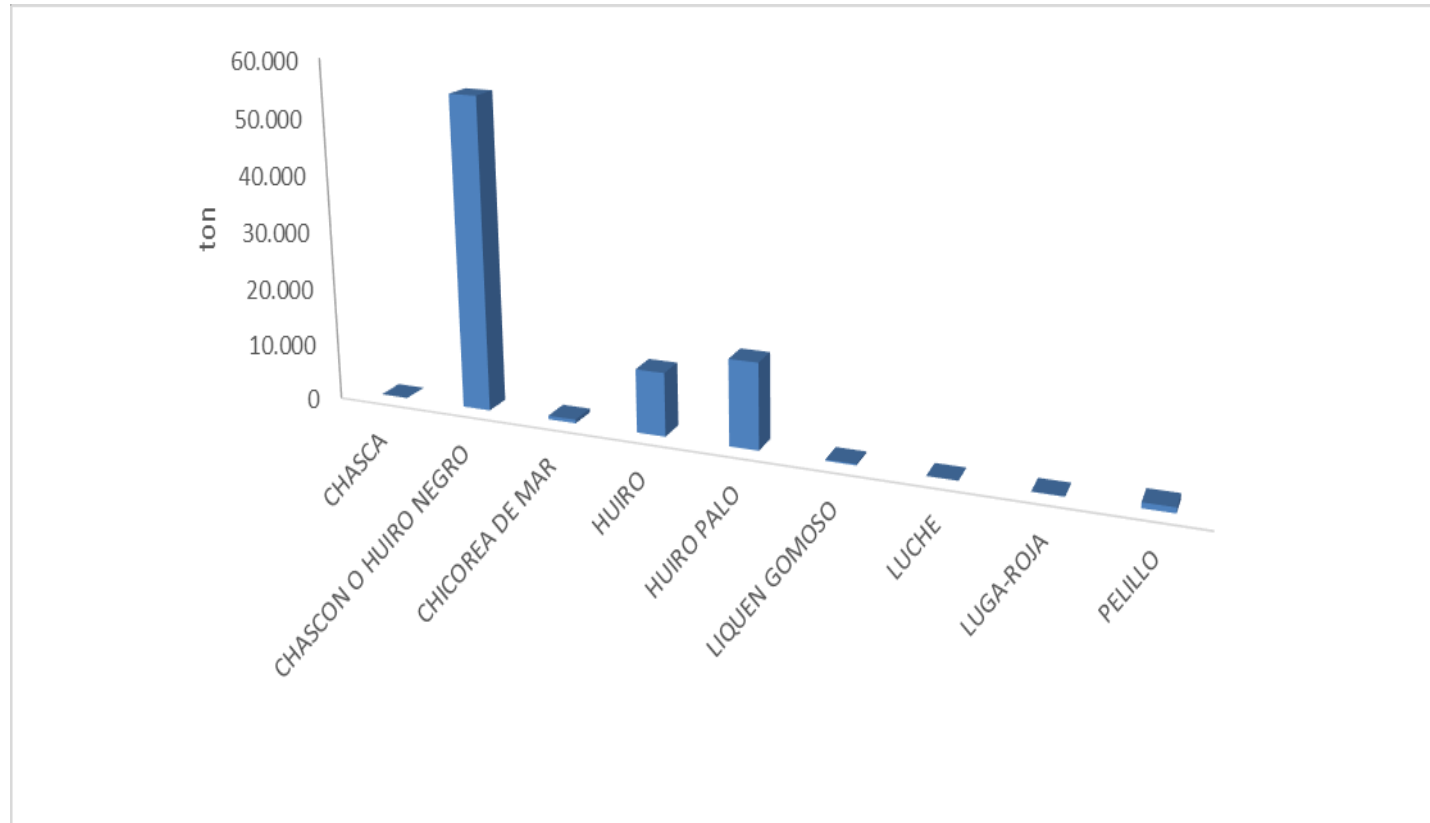
Pigmentos
Colorantes

Industria Farmacéutica

Fuentes de proteína
Antioxidantes
Anticoagulantes
Entre otros



Extracción de macroalgas en Atacama



	ton
CHASCA	2
CHASCON O HUIRO NEGRO	54.848
CHICOREA DE MAR	645
HUIRO	11.062
HUIRO PALO	14.976
LIQUEN GOMOSO	239
LUCHE	5
LUGA-ROJA	54
PELILLO	968

Nota: la mayor extracción es mediante la pesca artesanal

Que debemos saber para cultivar, manejar y repoblar?..

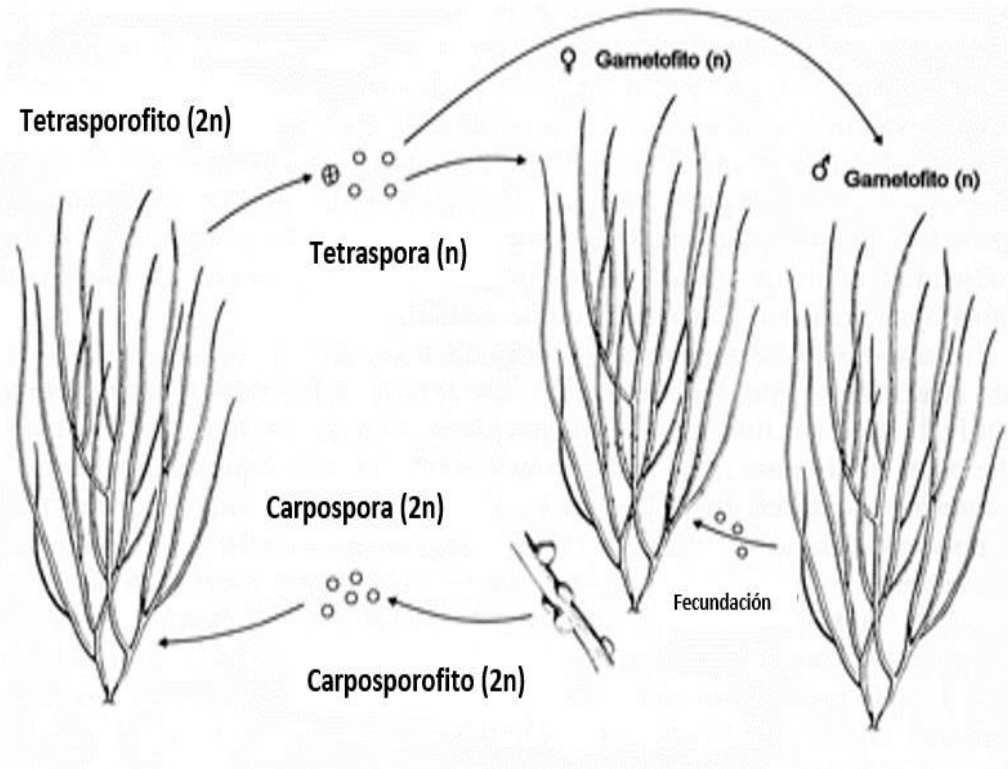
Biología de la
especie

Sistemas de
cultivo

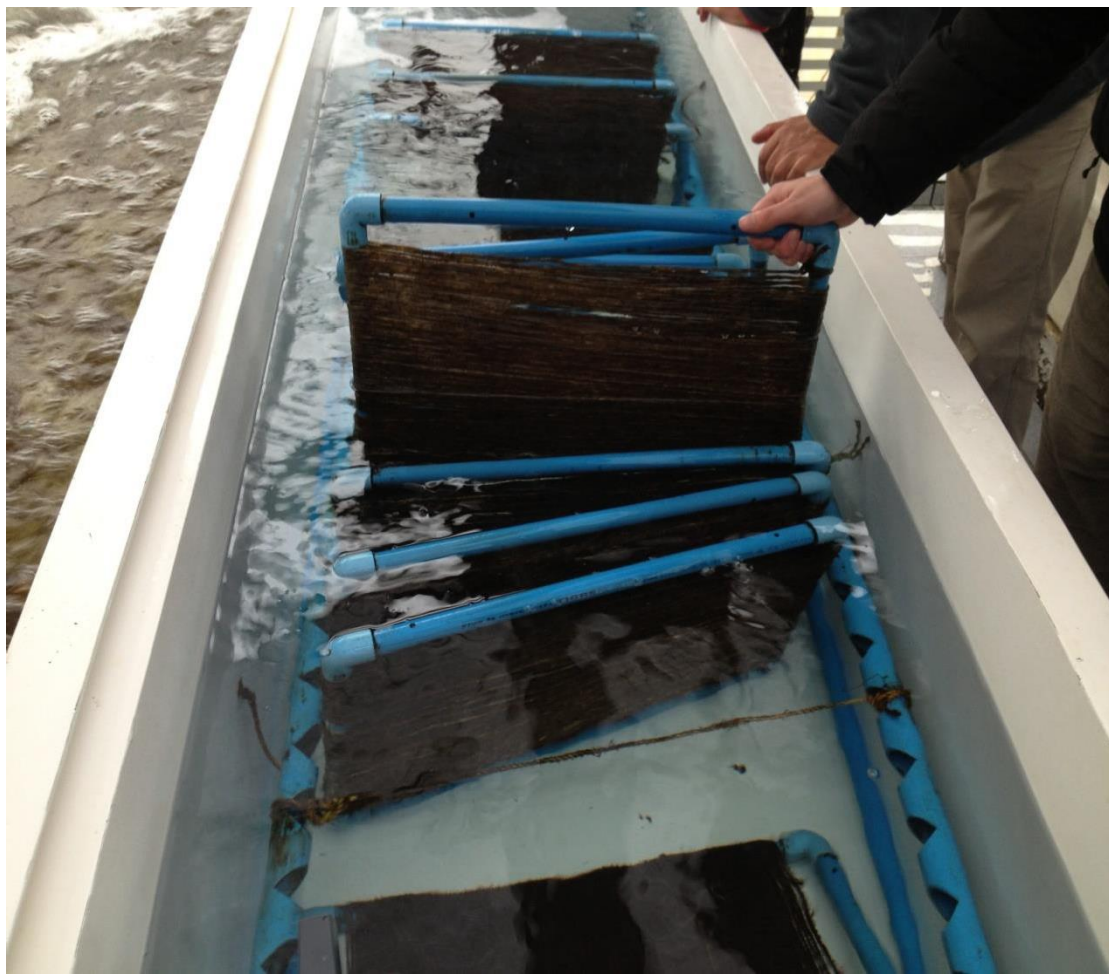
Formas de
repoblamiento

Manejo

Cultivo de *Gracilaria chilensis* a partir de esporas

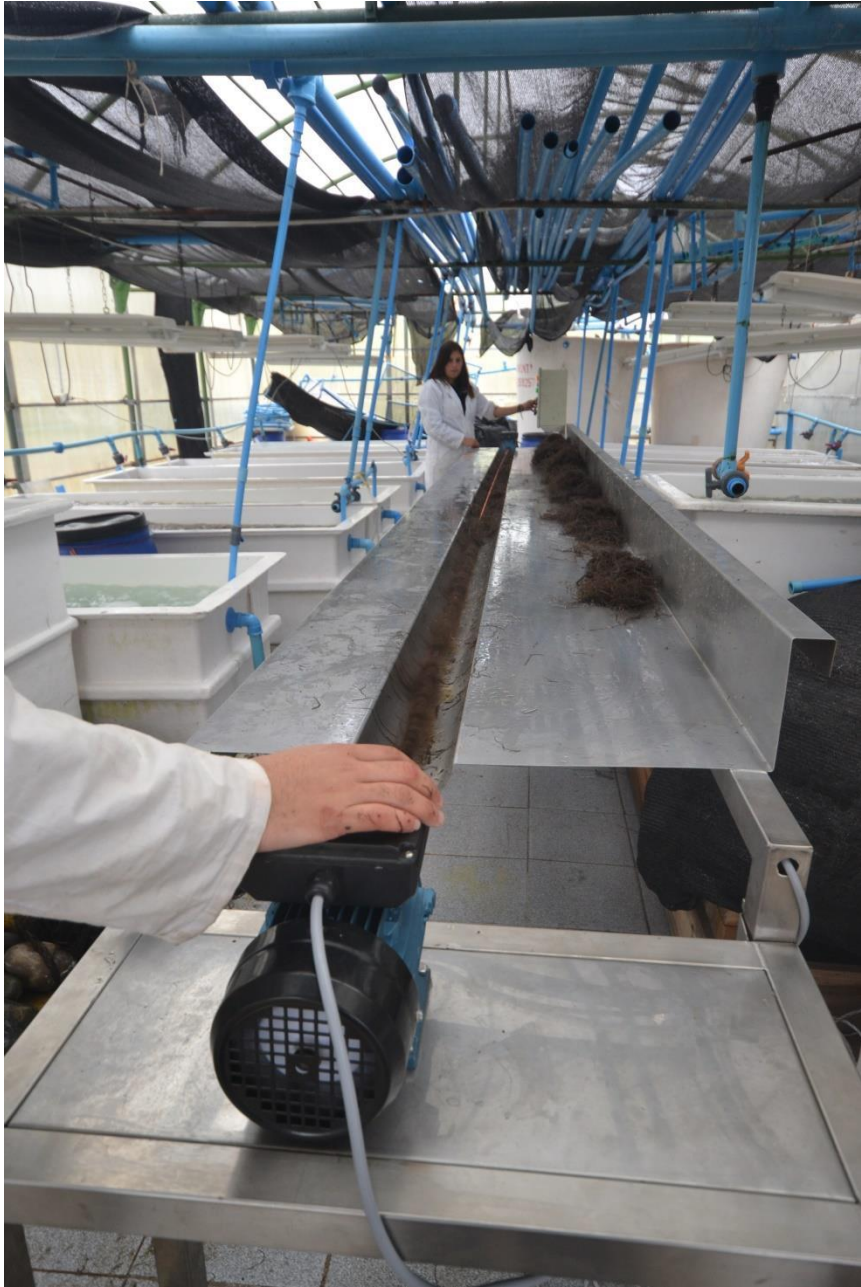












Submareal





15 Días



2 Meses

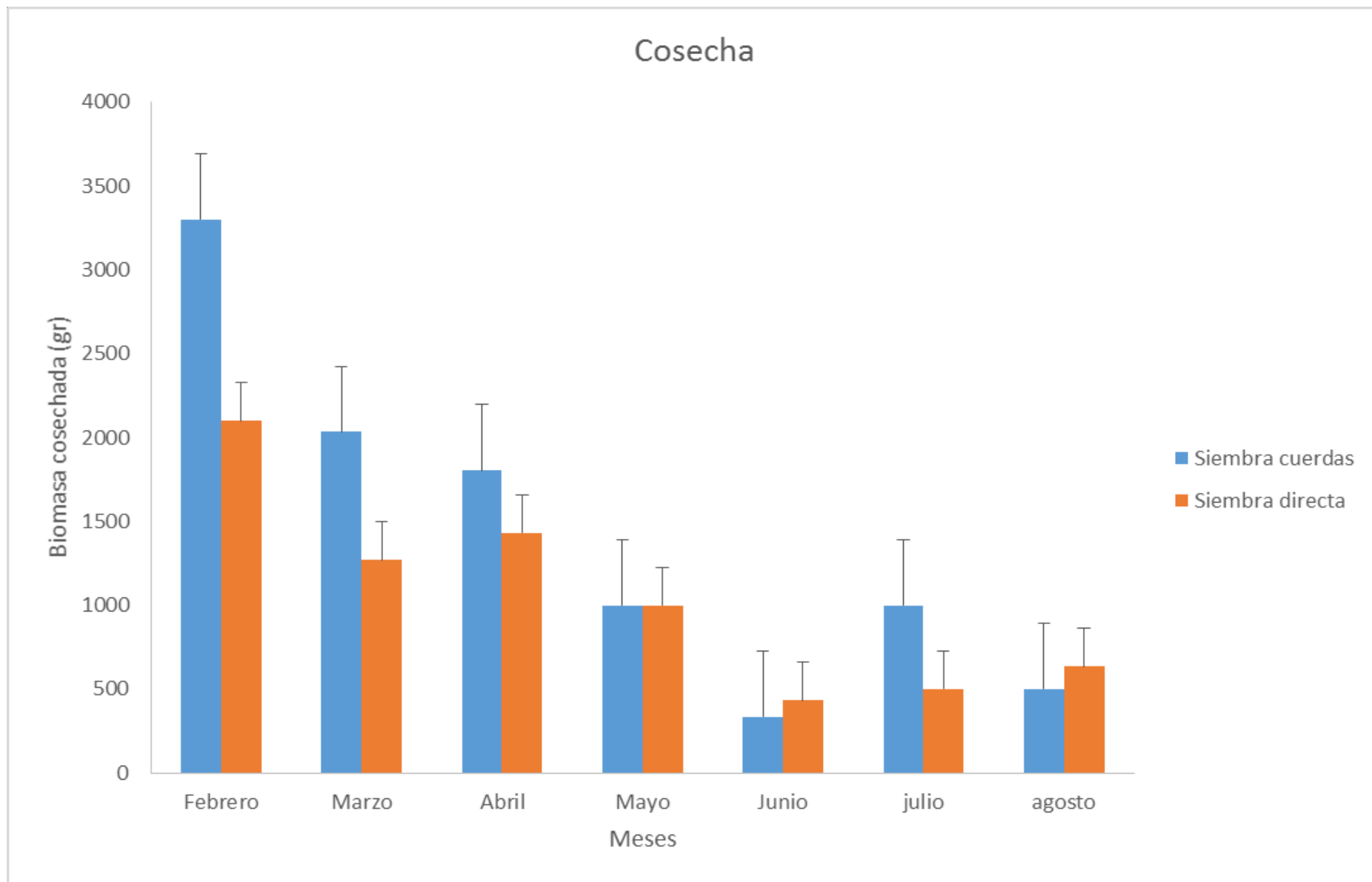


3 Meses



Intermareal





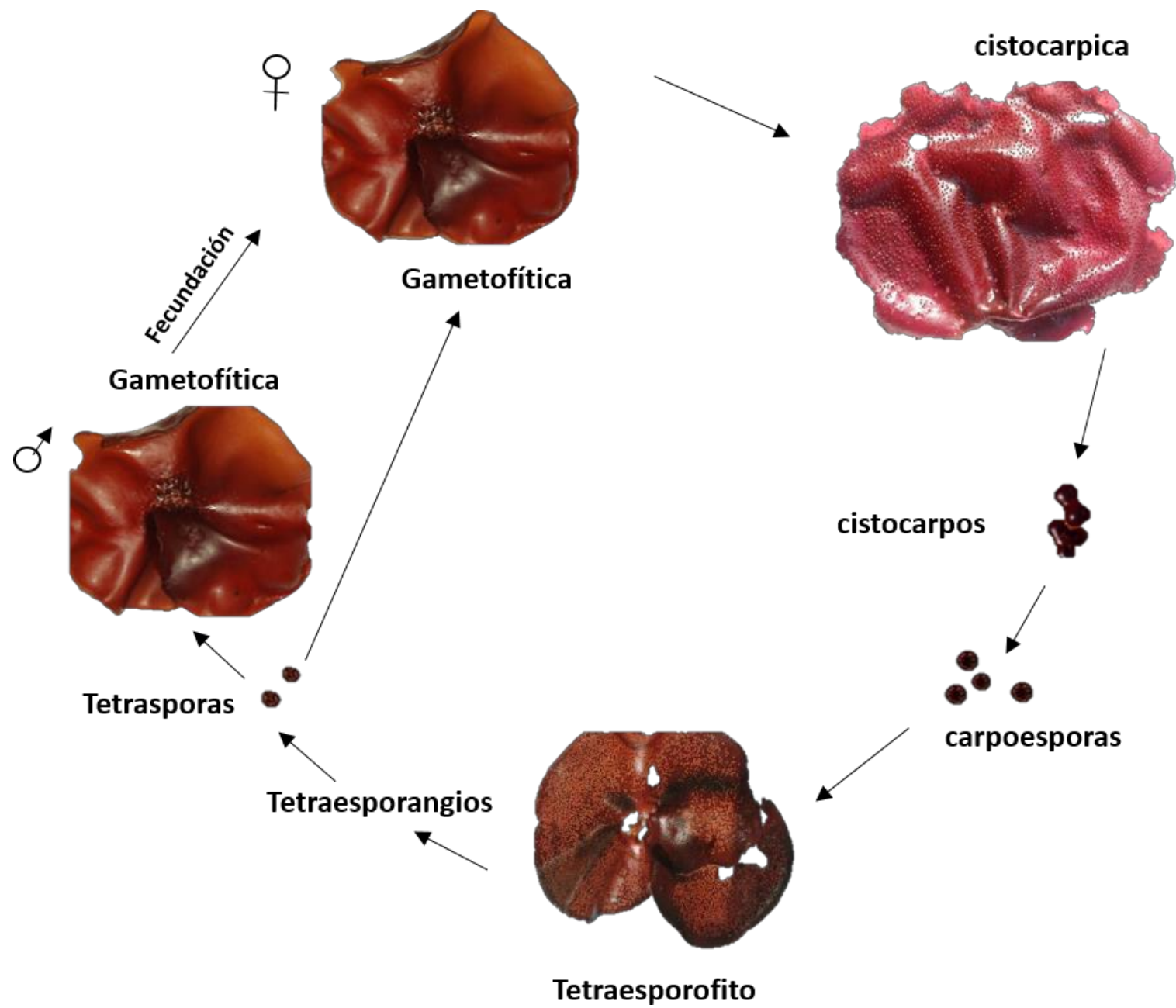
Promedio de cuerdas de 5 metros.

Siembra: Enero (Biomasa inicial: 600 gr x cuerda)

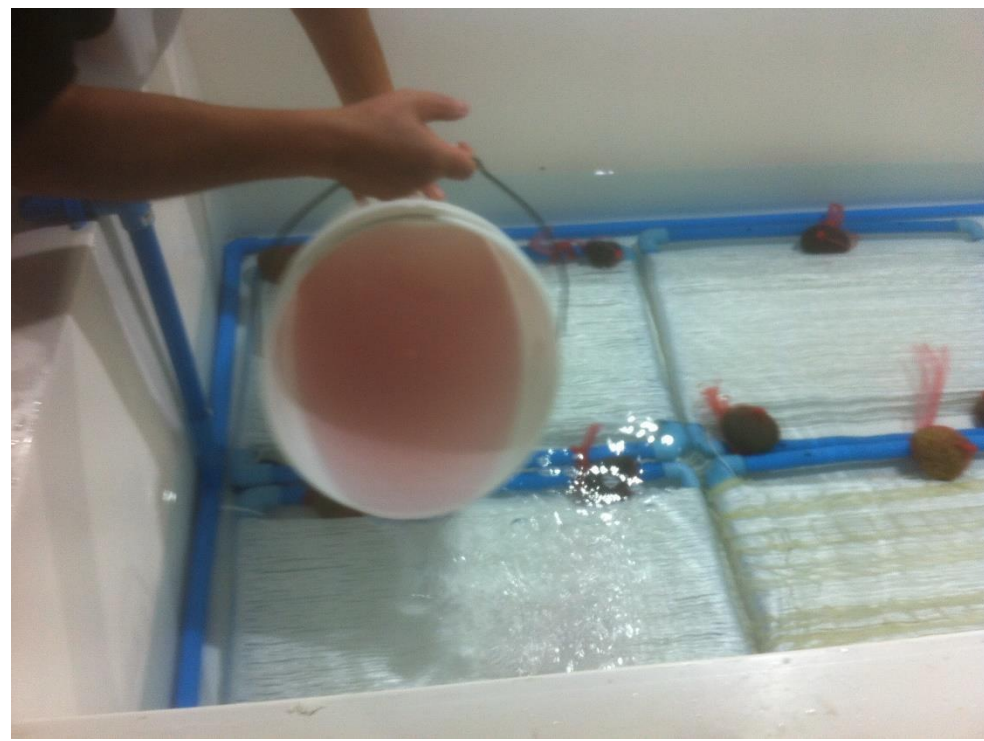
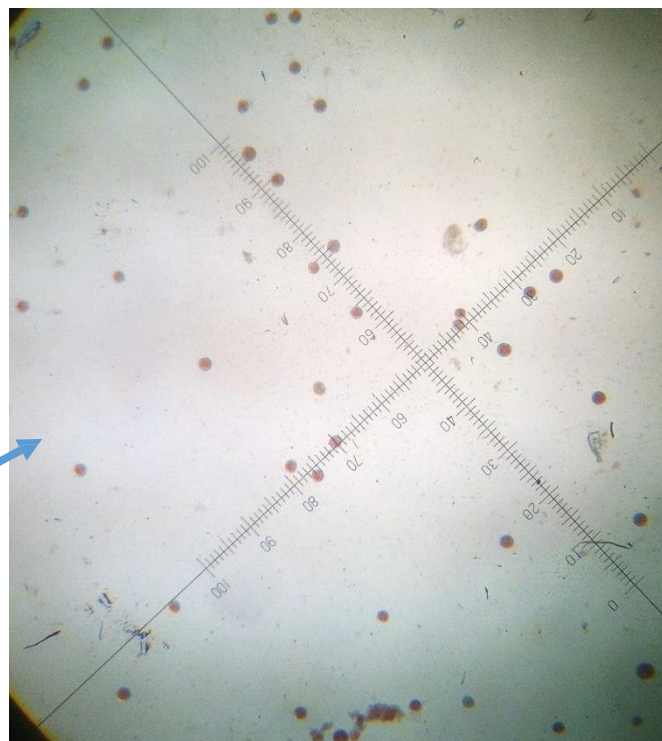
Luga Roja

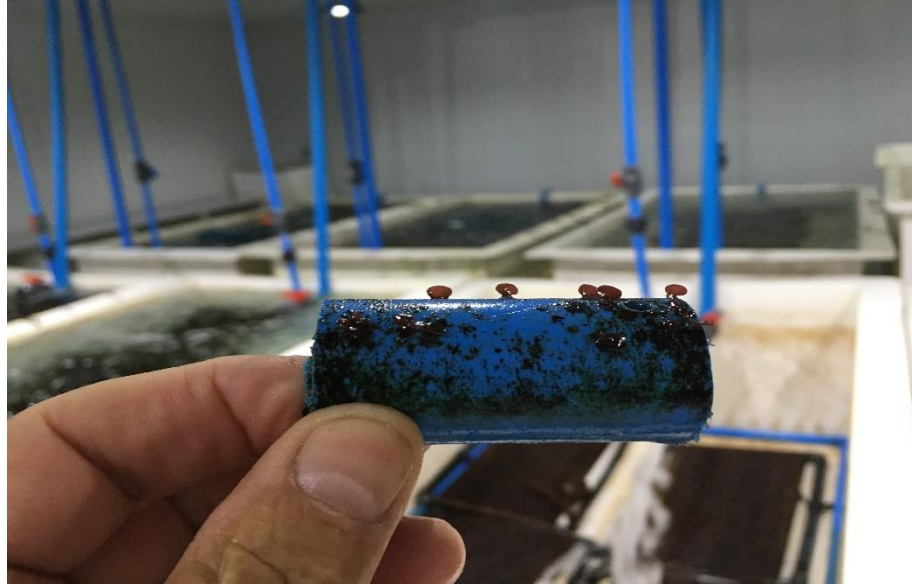
Cultivo vía esporas



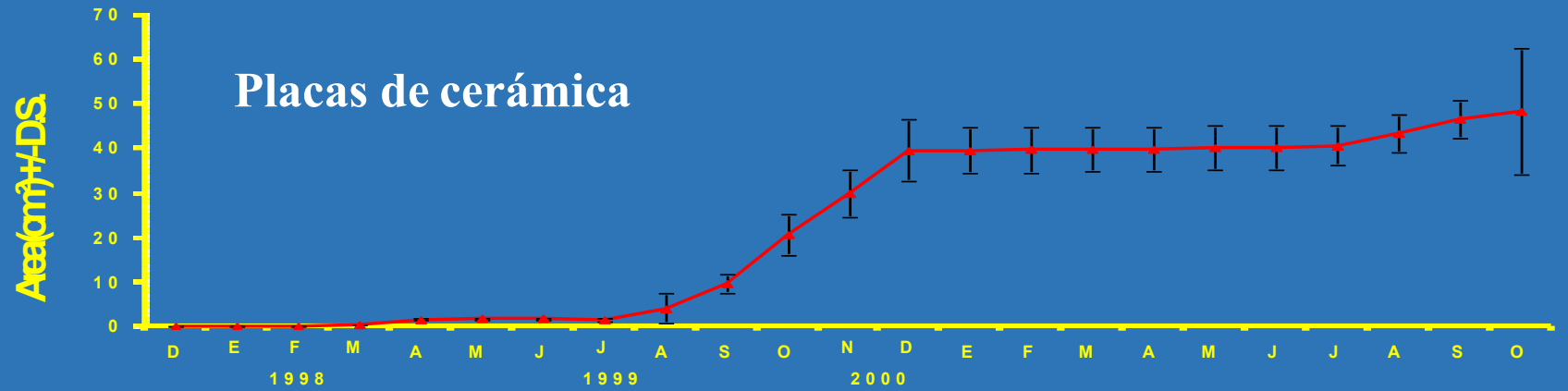
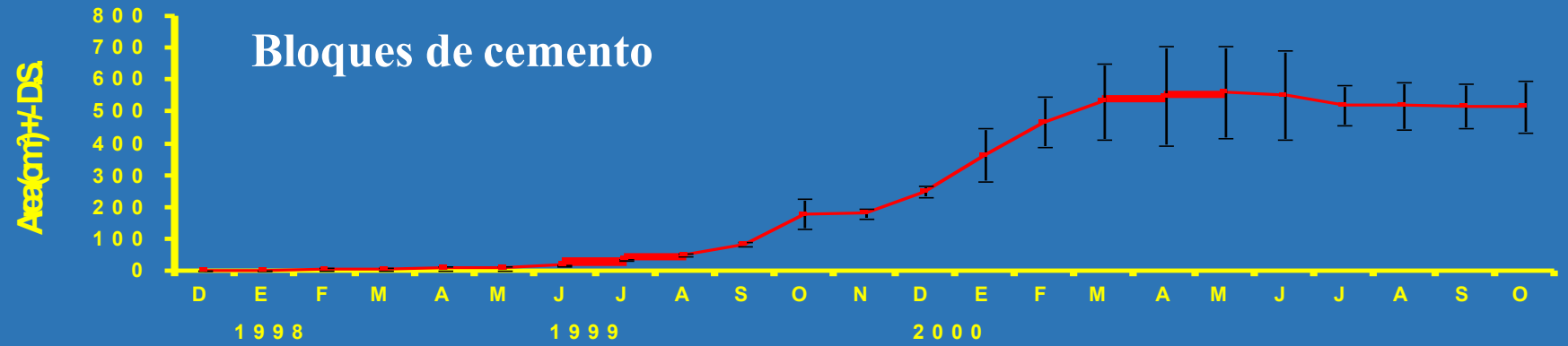
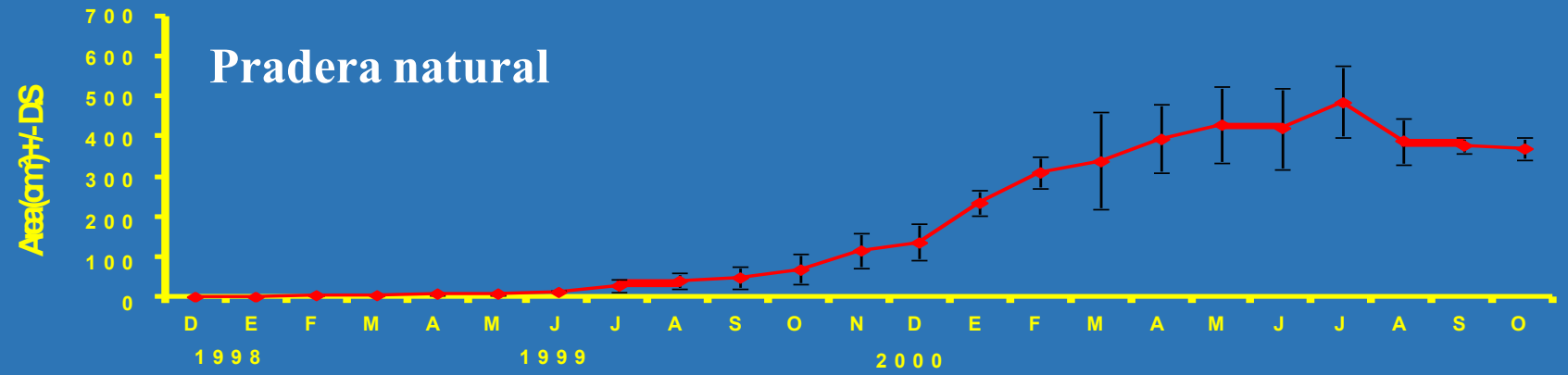
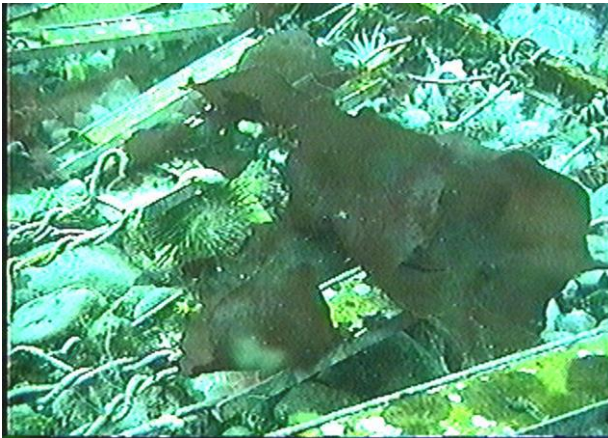




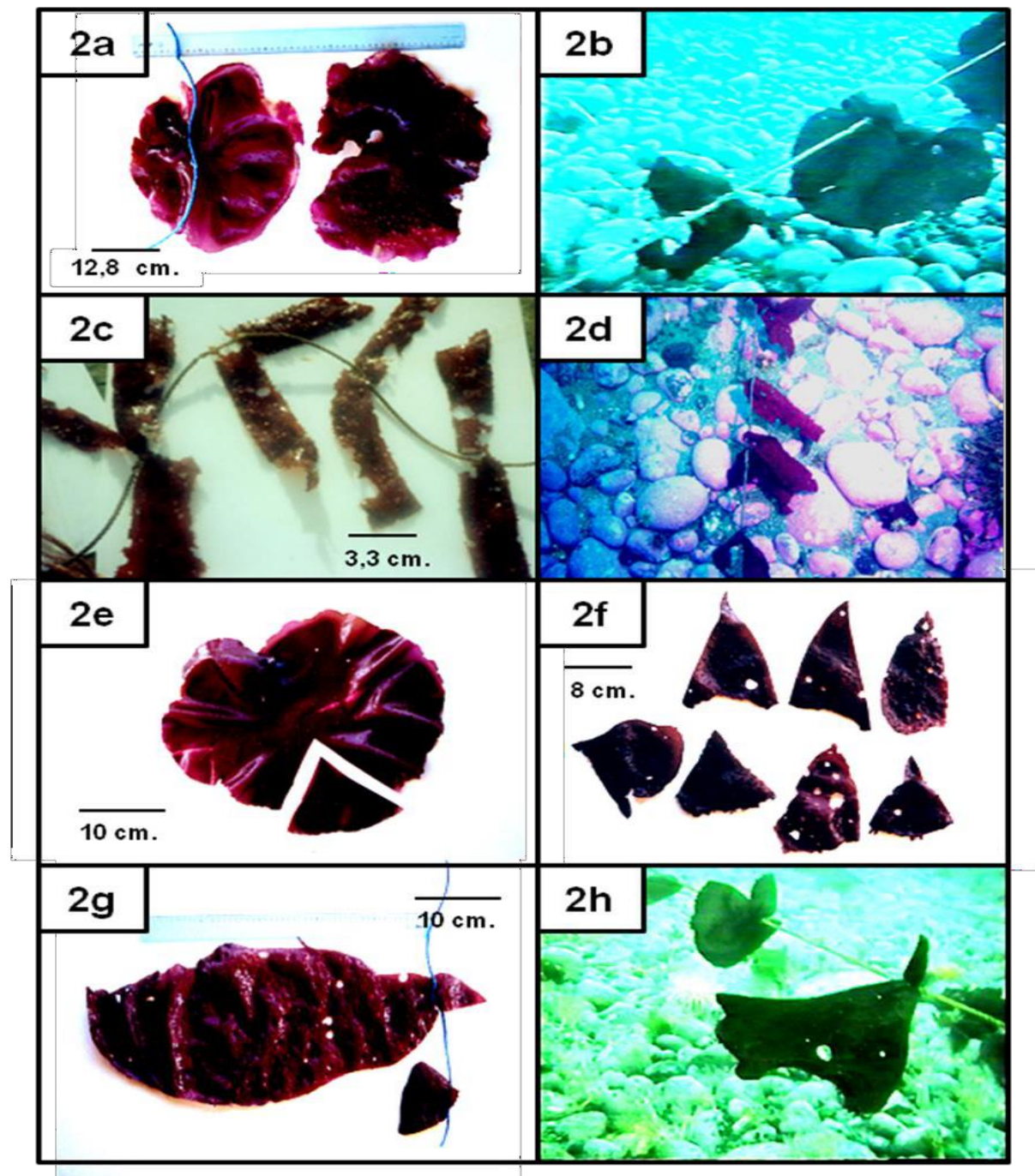








Cultivo suspendido a través de fragmentación de talos





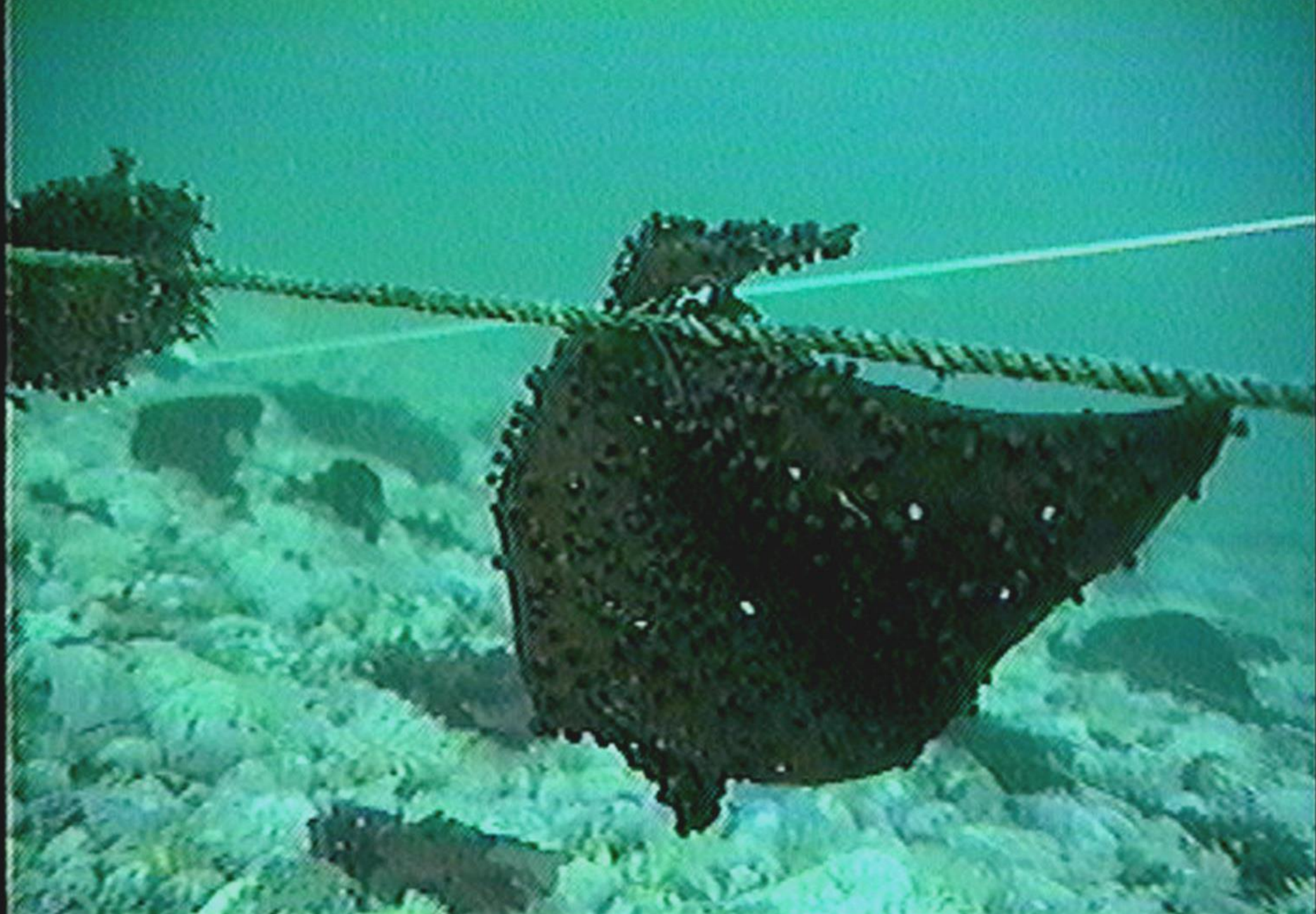
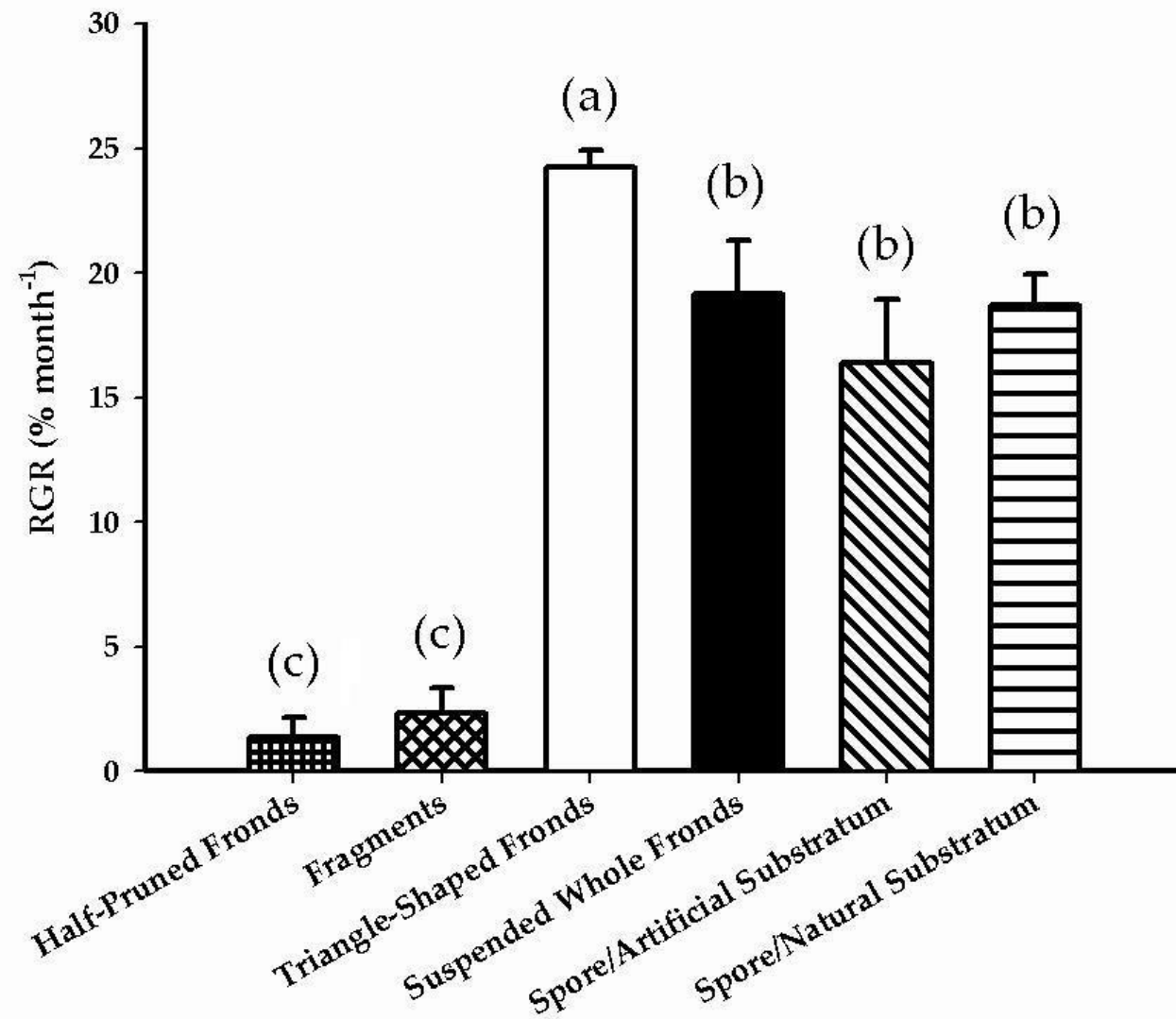
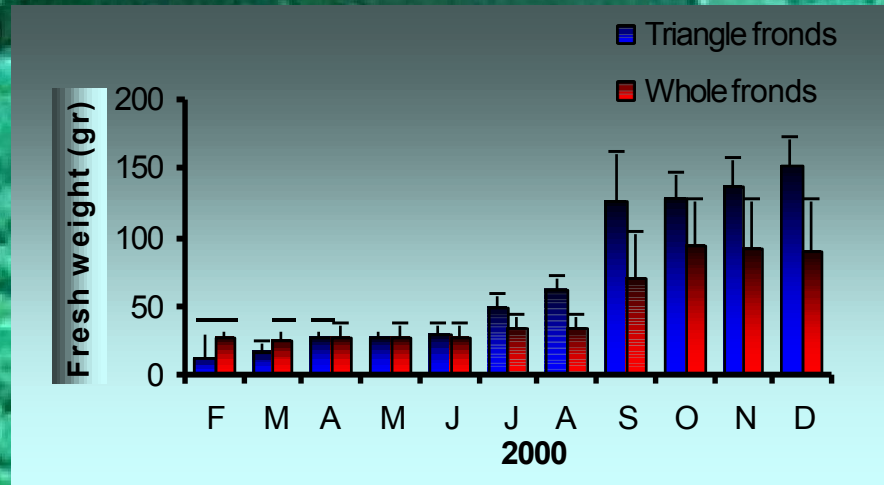




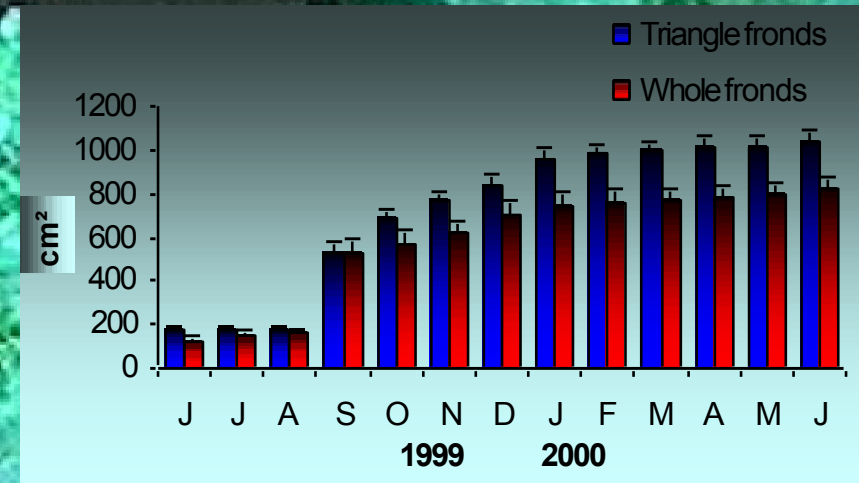
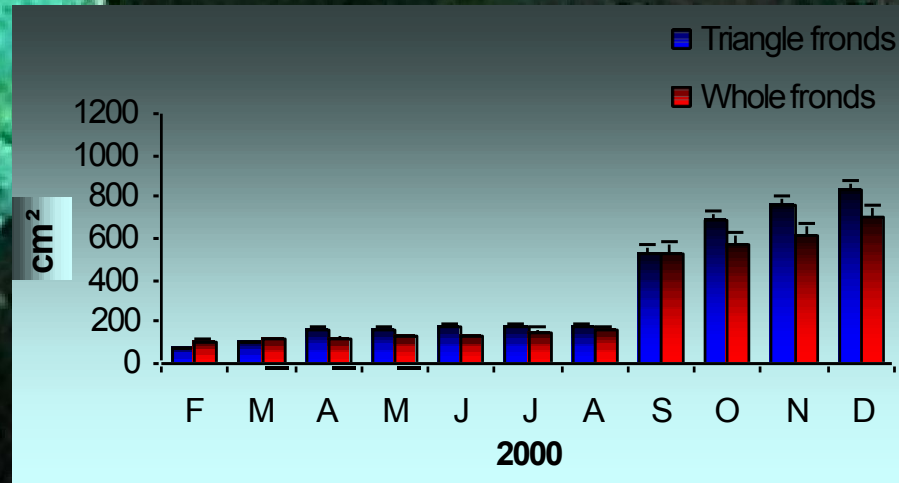
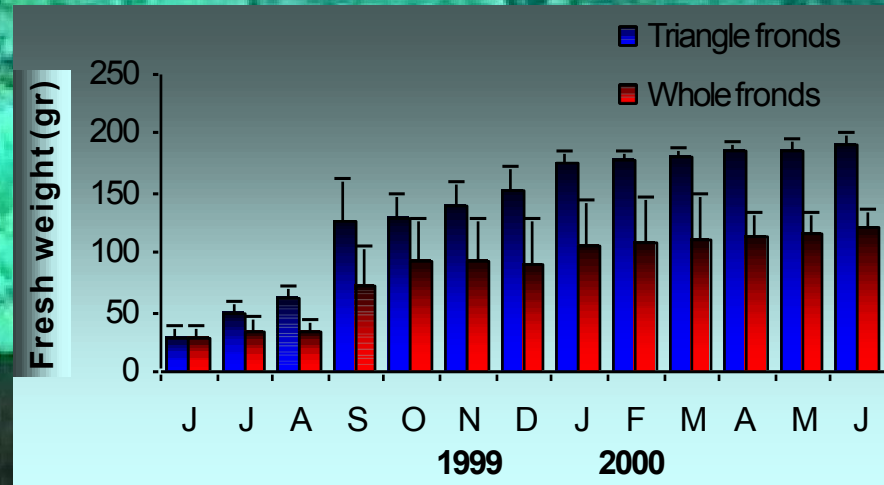
Figure 1



Inoculation Summer

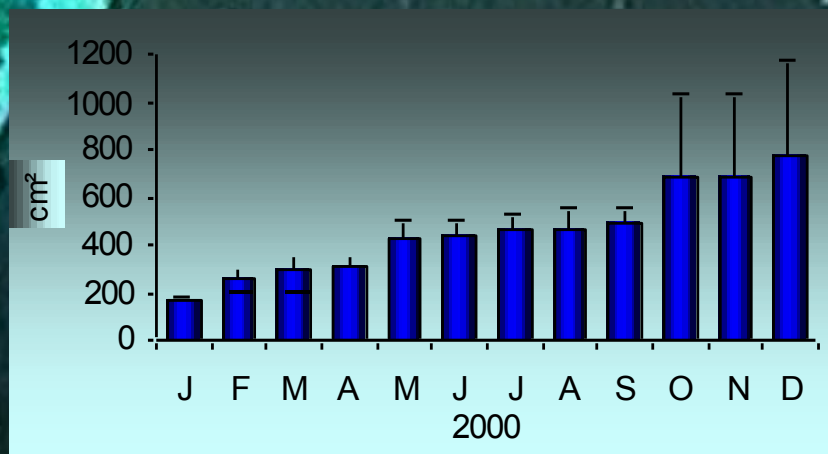
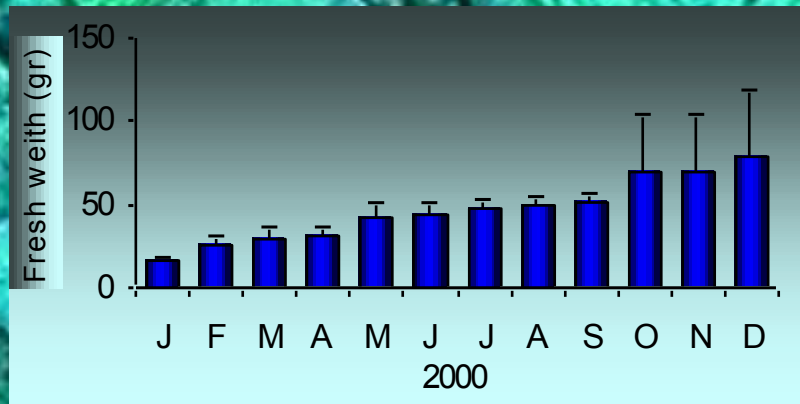


Inoculation Winter

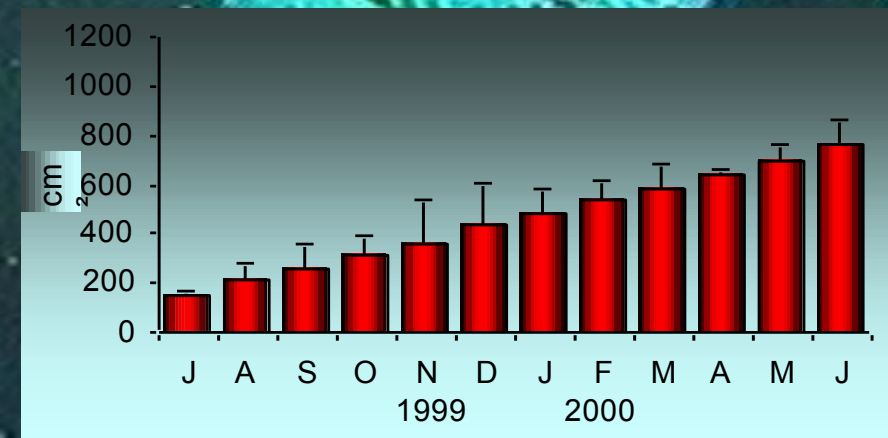
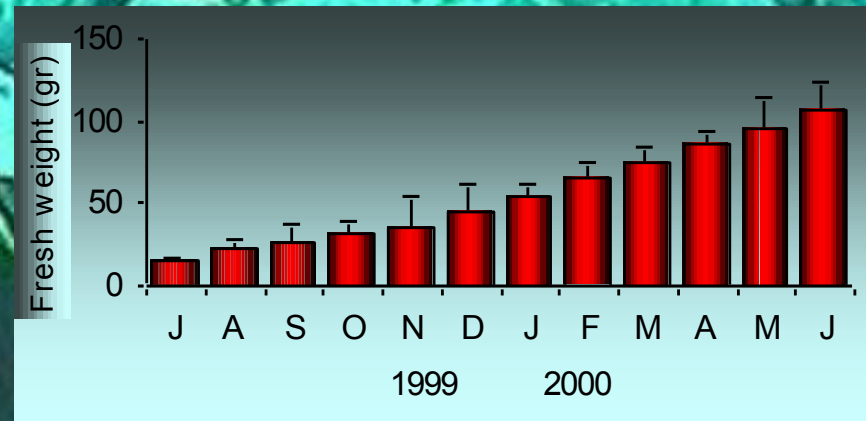


Effect of Pruning Season

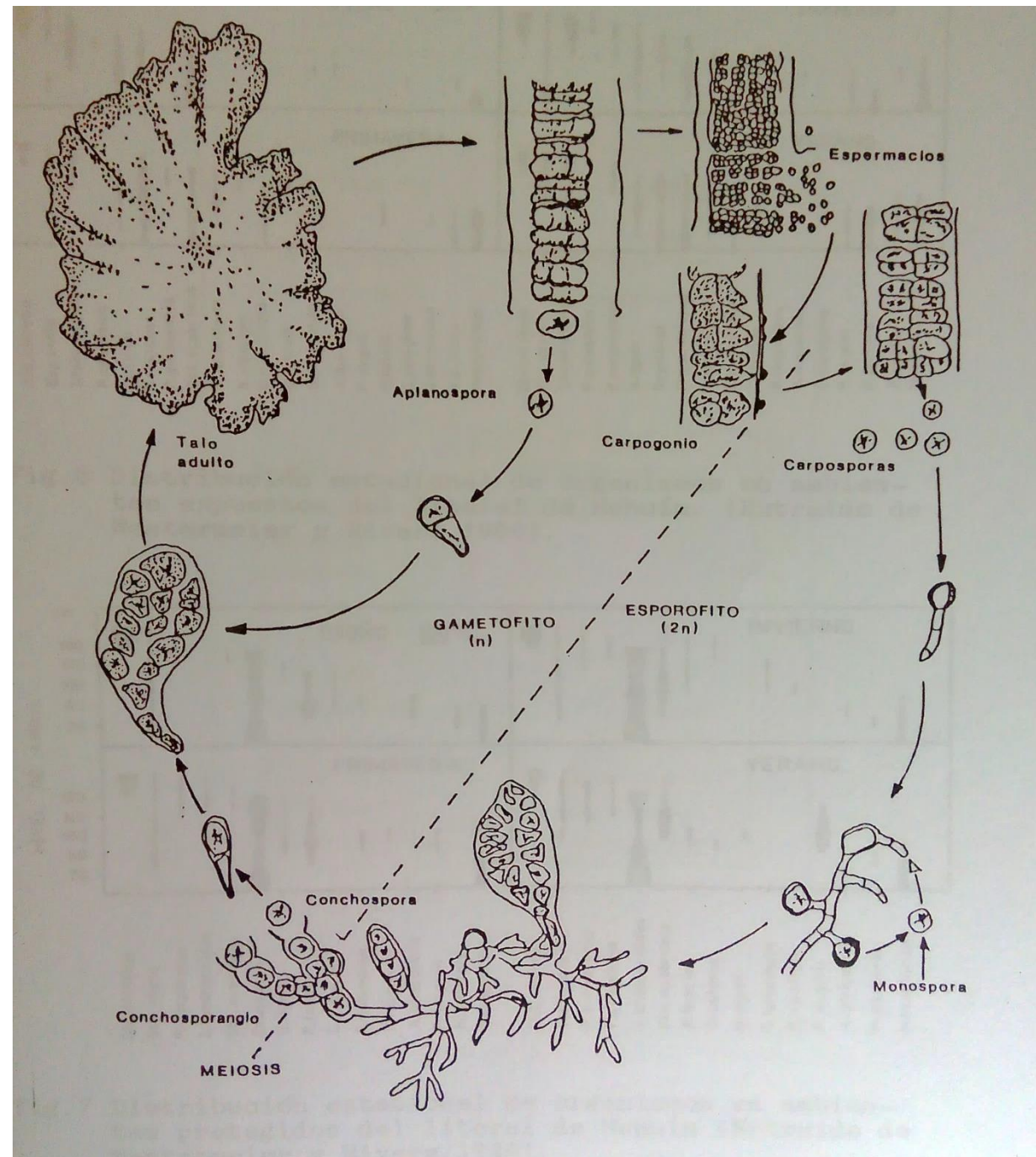
Summer



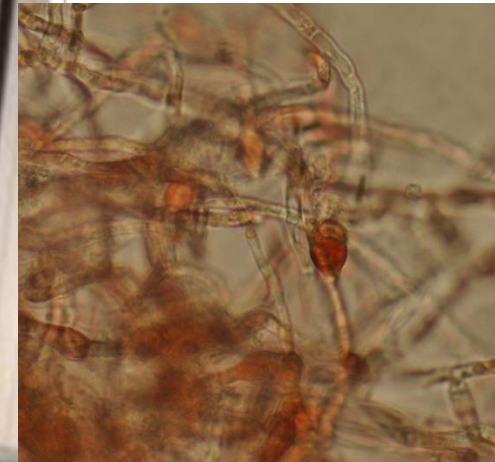
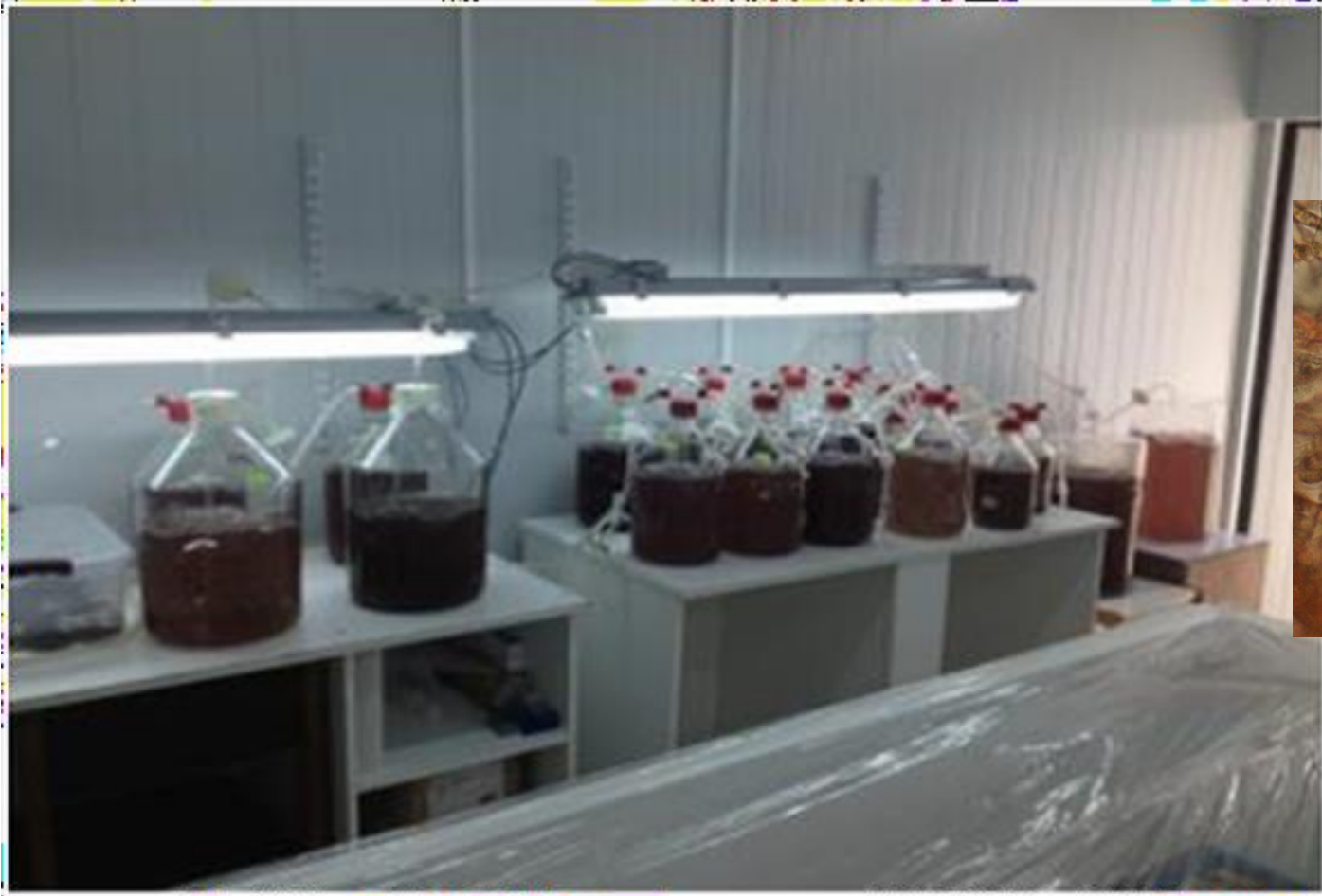
Winter



Cultivo de luche

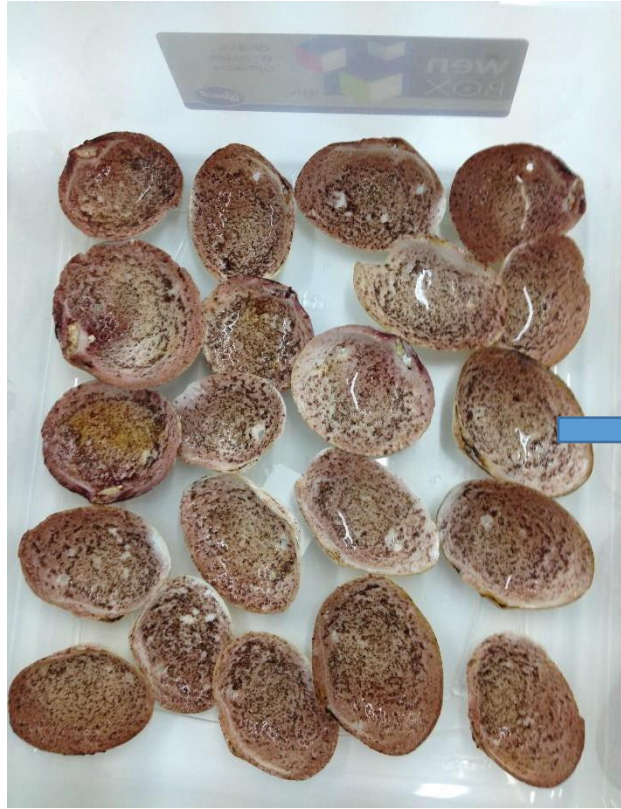


Propagación de Filamentos Conchocelis



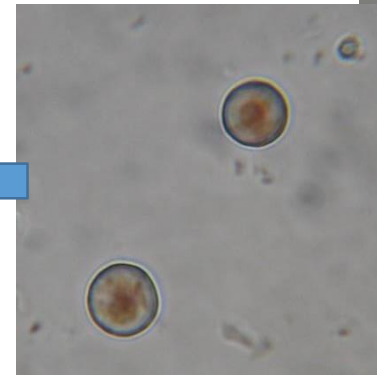
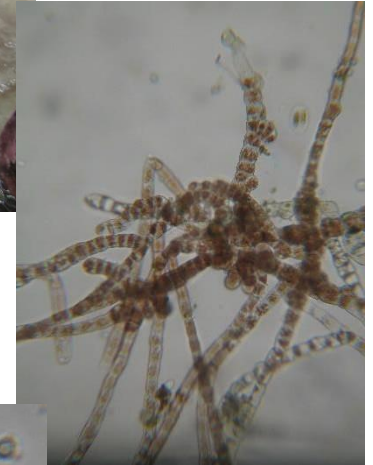
Preparación de valvas y siembra de filamentos conchocelis







Inoculación de Redes



Sistema de cultivo de levante en Maullin (Rio Cariquilda, Concesión UaCh).

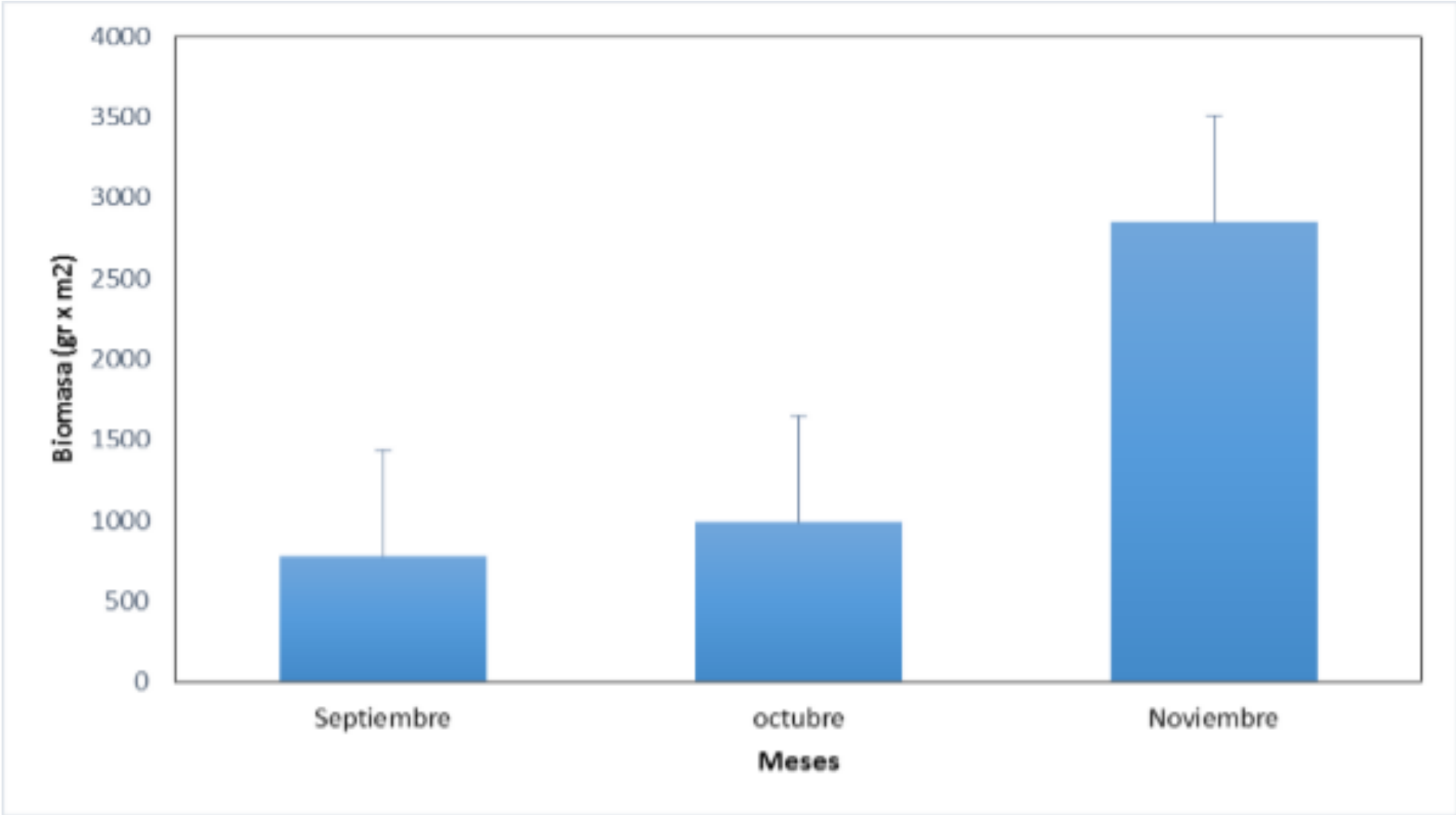




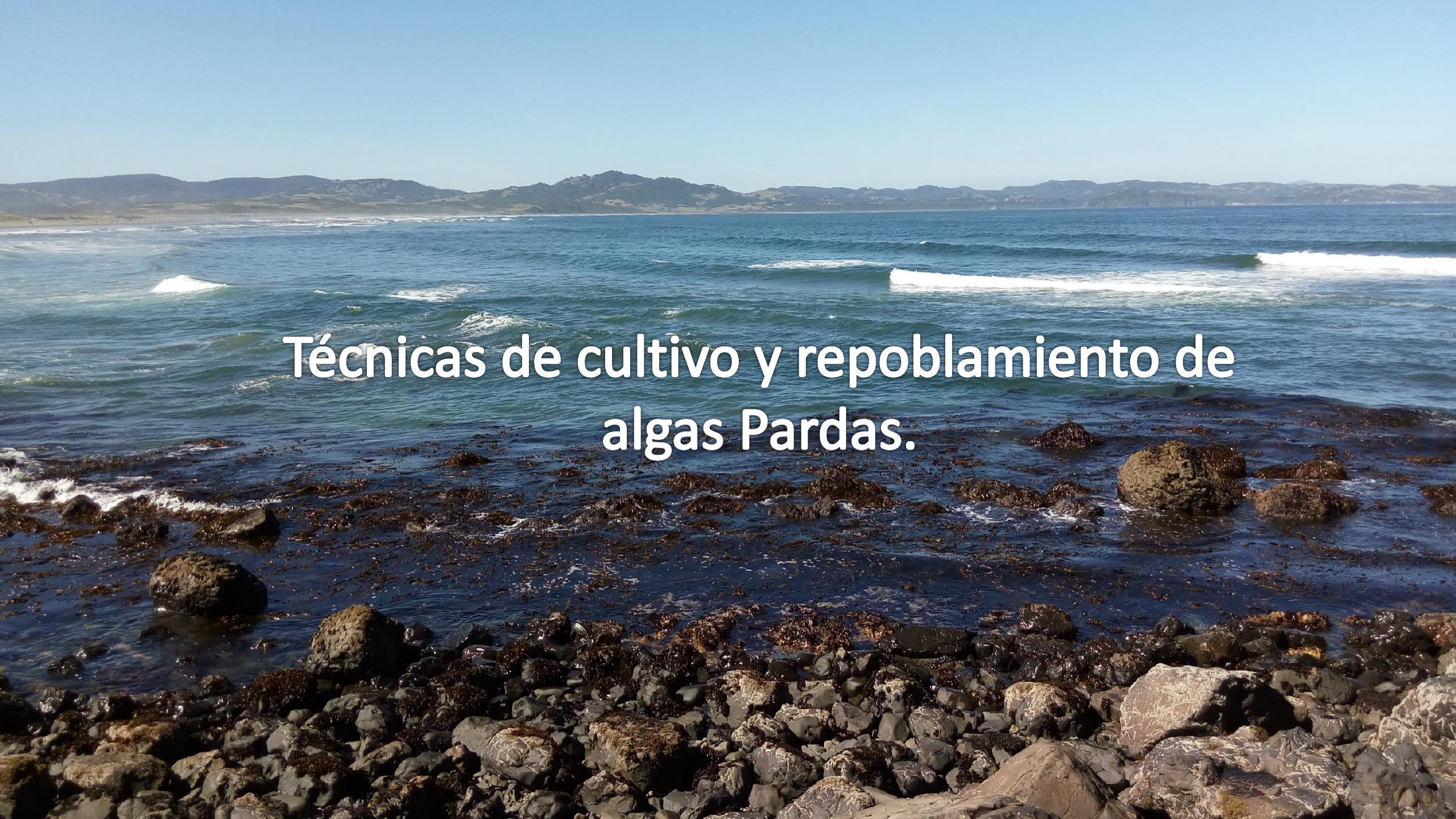




Biomasa cosechada en la temporada de cultivo

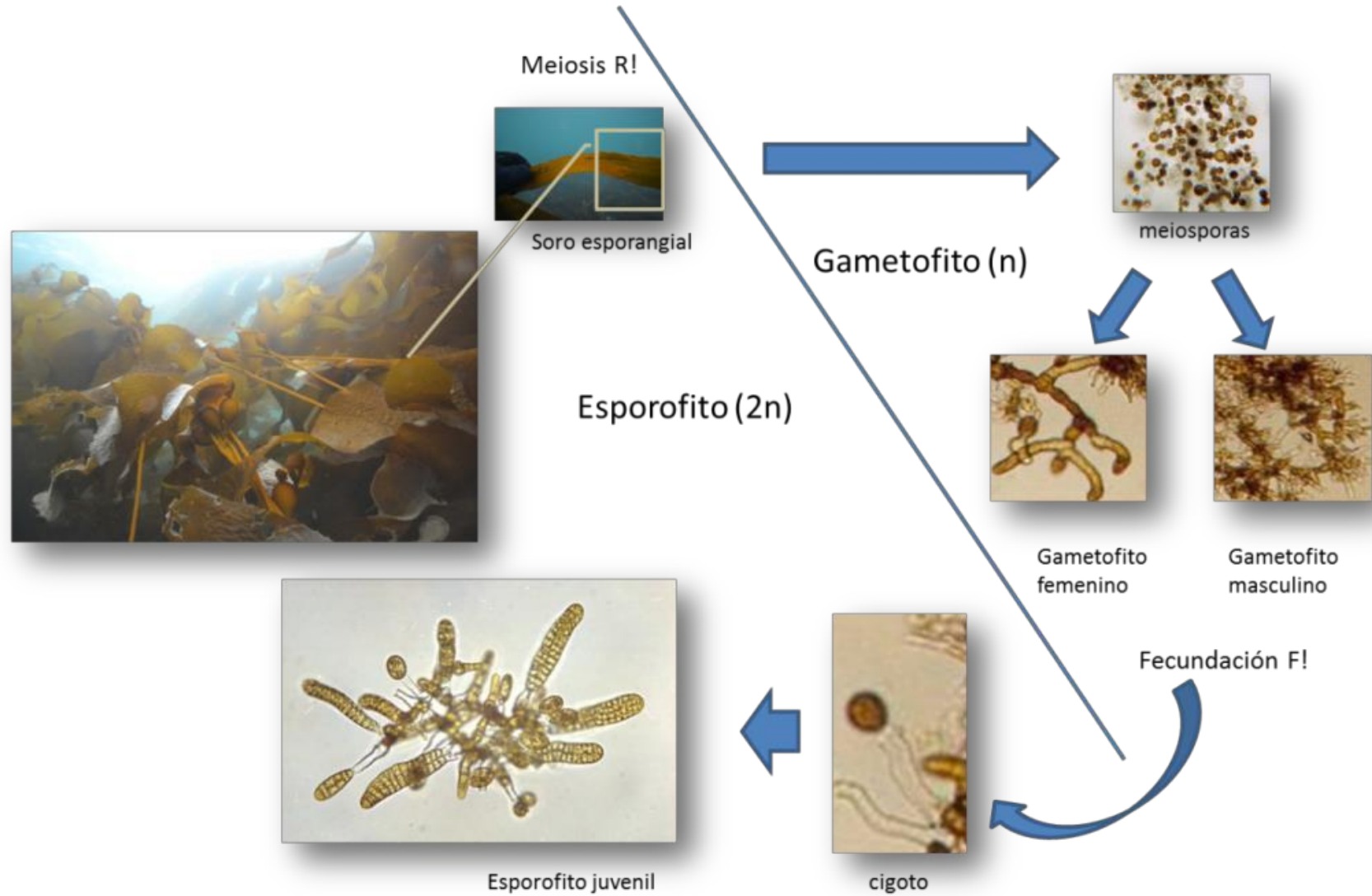




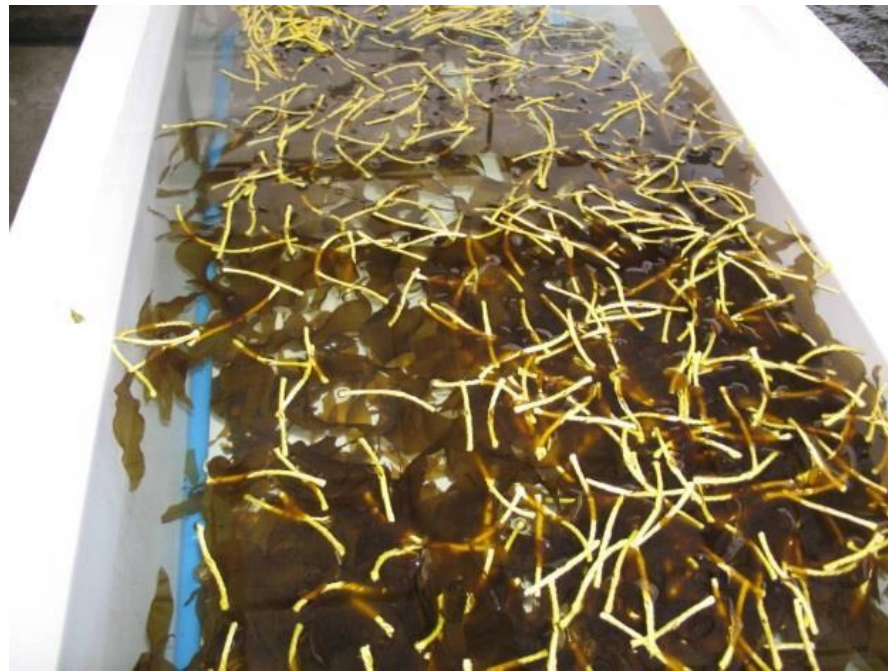
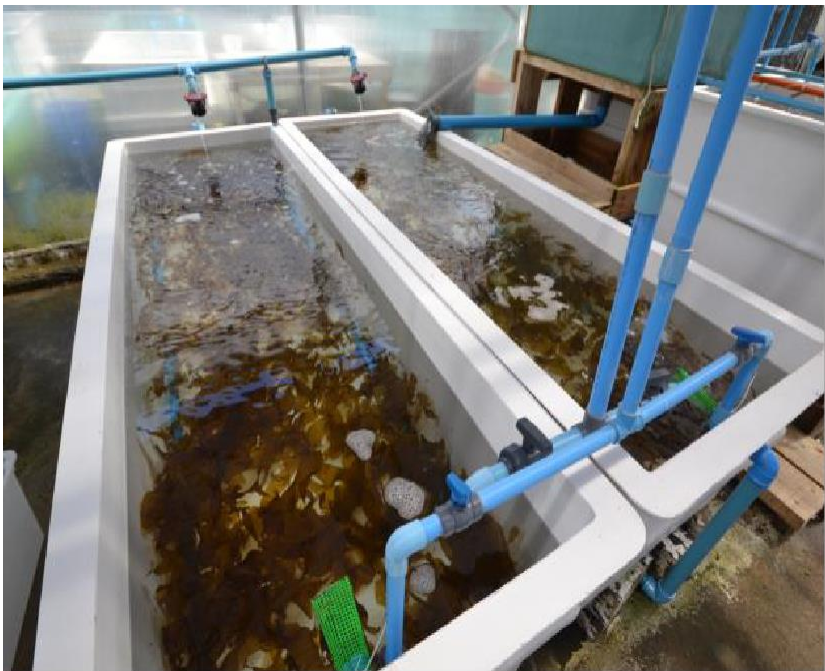
A wide-angle photograph of a coastal scene. In the foreground, dark, wet rocks are scattered across the lower half of the frame, some covered in dark seaweed. The ocean is a deep blue, with white-capped waves breaking in the middle ground. The horizon is marked by a range of low, rolling hills under a clear, pale blue sky. The text 'Técnicas de cultivo y repoblamiento de algas Pardas.' is overlaid in the center of the image in a white, sans-serif font.

Técnicas de cultivo y repoblamiento de algas Pardas.

Producción de Algas Pardas:







Manual del cultivo de alga parda *Macrocyctis pyrifera* (huiro), Chile. Proyecto FONDEF D00I1144. Universidad Austral de Chile, 38 pp. ISBN:149.733. MMI. Año 2005









ZONAS NO APTAS PARA CULTIVOS

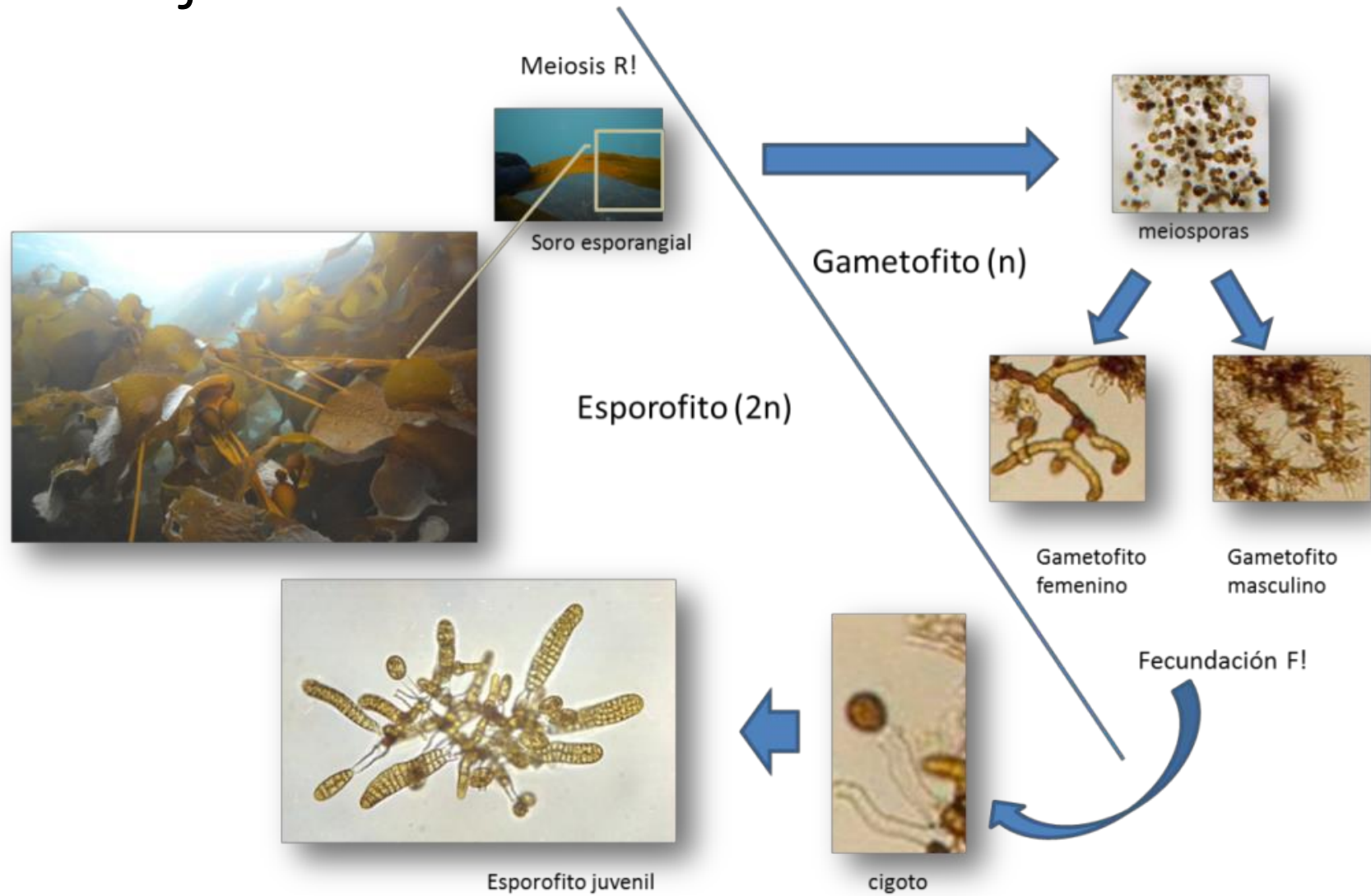
Bryozoo



Piure blanco

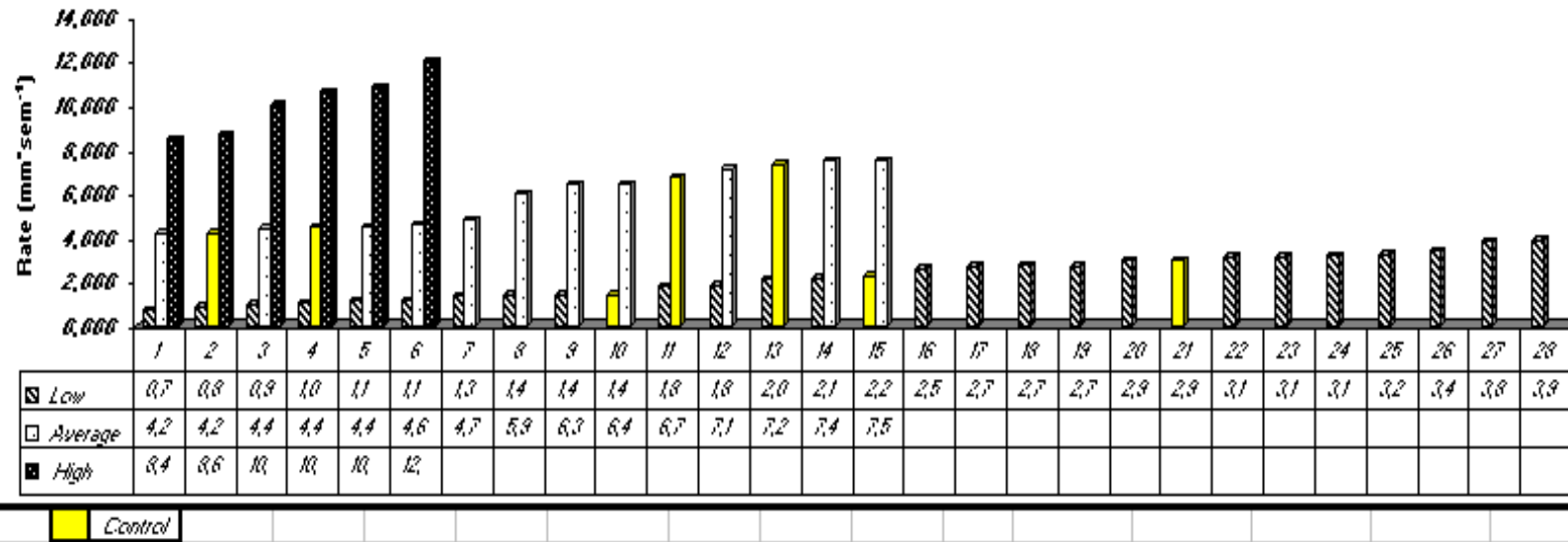


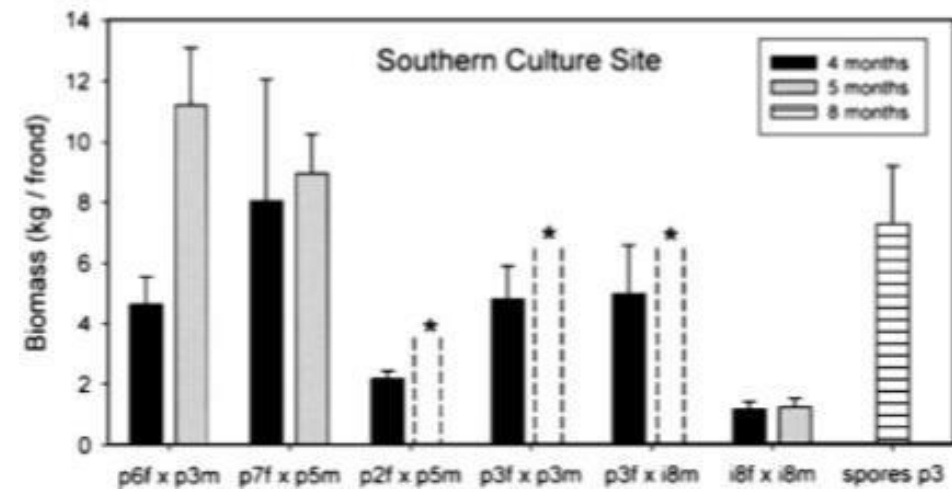
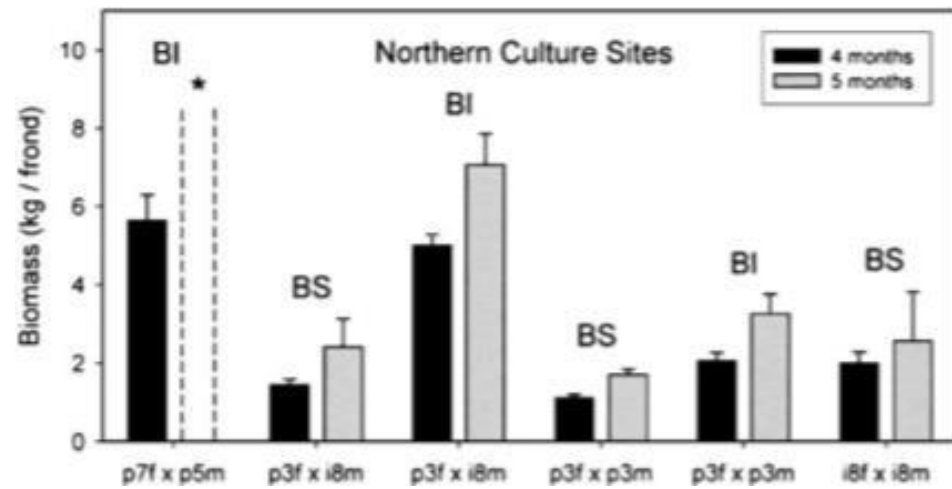
Fases mejoradas



Variedades mejoradas

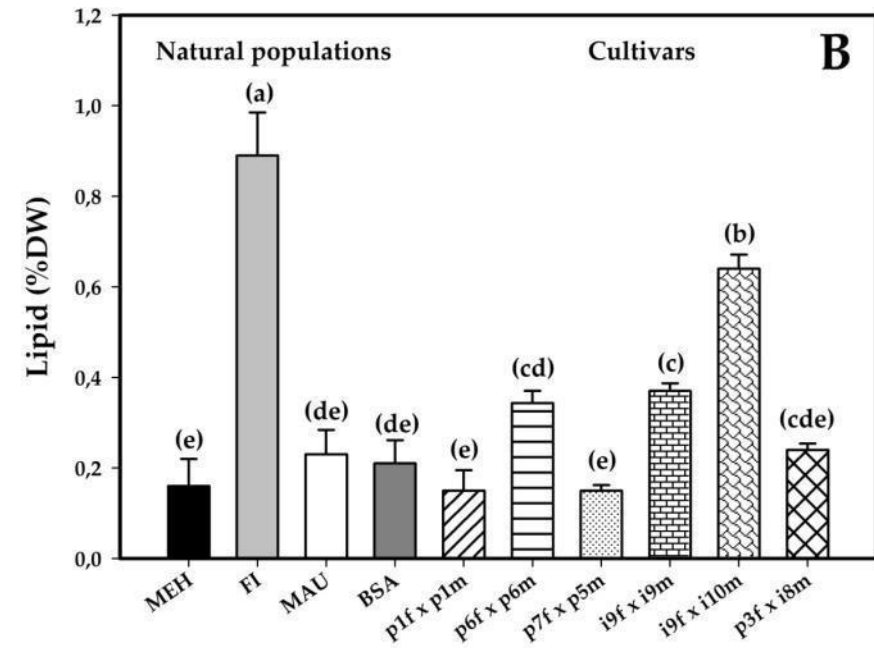
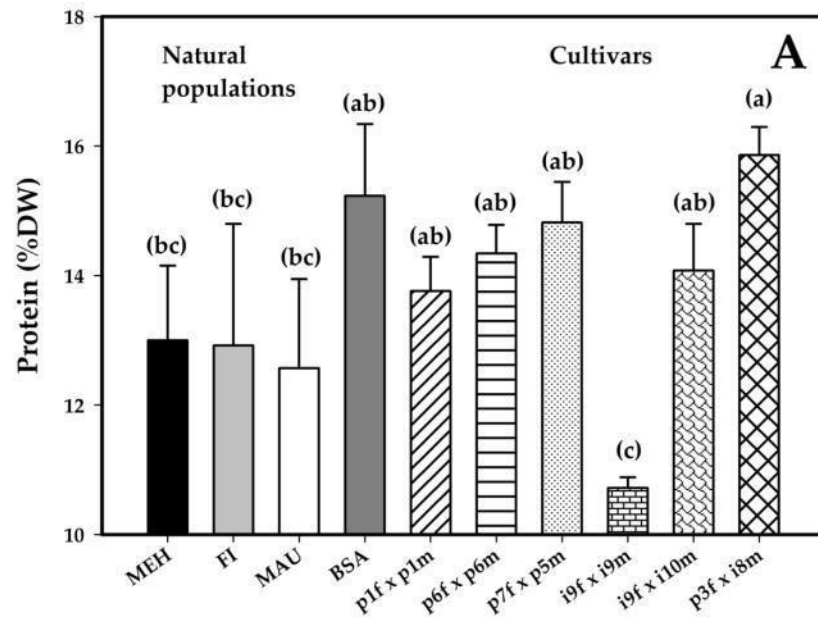
Growth Rates





Westermeyer *et al.* (2010)

Composición química



Westermeyer *et al*, 2012

Técnicas de repoblamiento

Westermeier et al 2011,2013







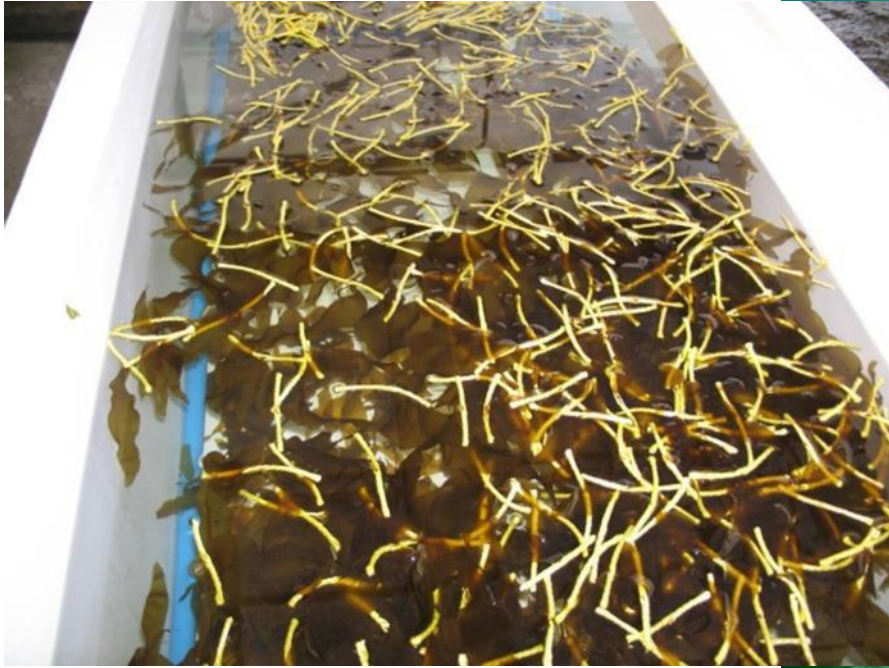


Fijación de esporofitos sobre bolones, utilizando elástico



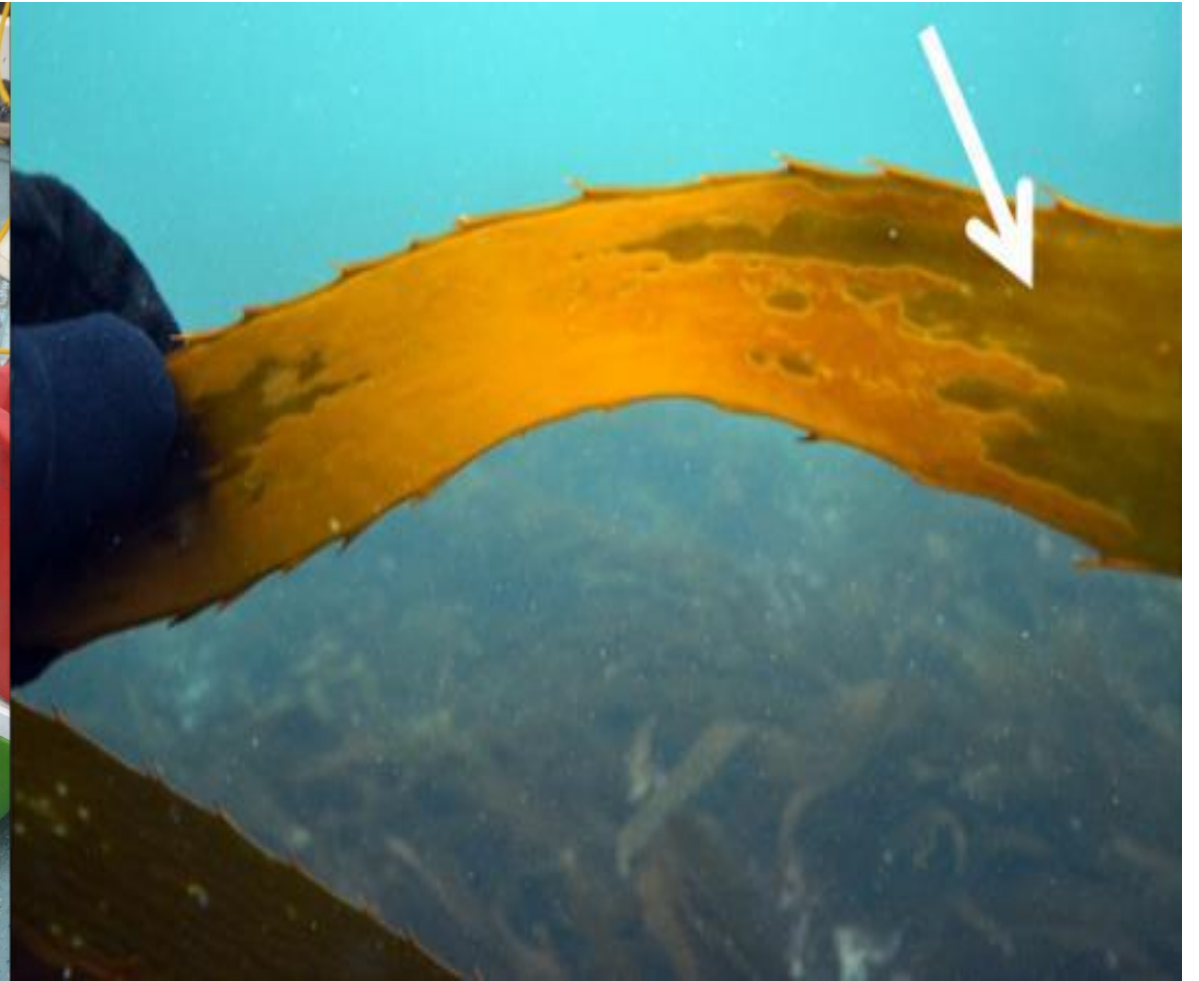
Westermeier et al 2011,2013

Fijación de esporofitos sobre bolones, utilizando Pegamento



Westermeier et al 2011,2013

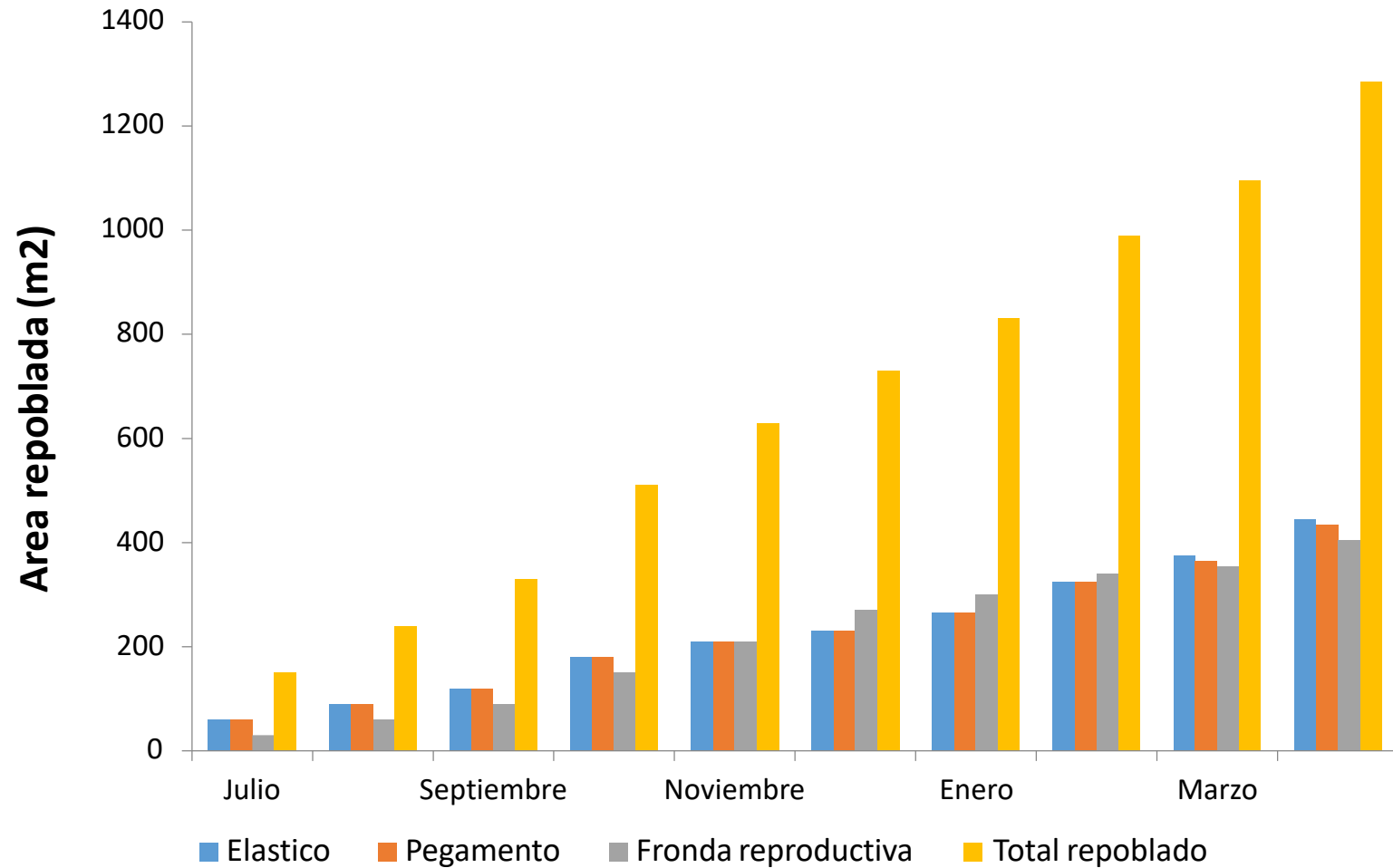
Fijación de frondas reproductivas sobre bolones, utilizando mallas de algodón



Westermeier et al 2011,2013



Grado de repoblamiento de *M. integrifolia* en áreas despejadas en Bahía Chasco.



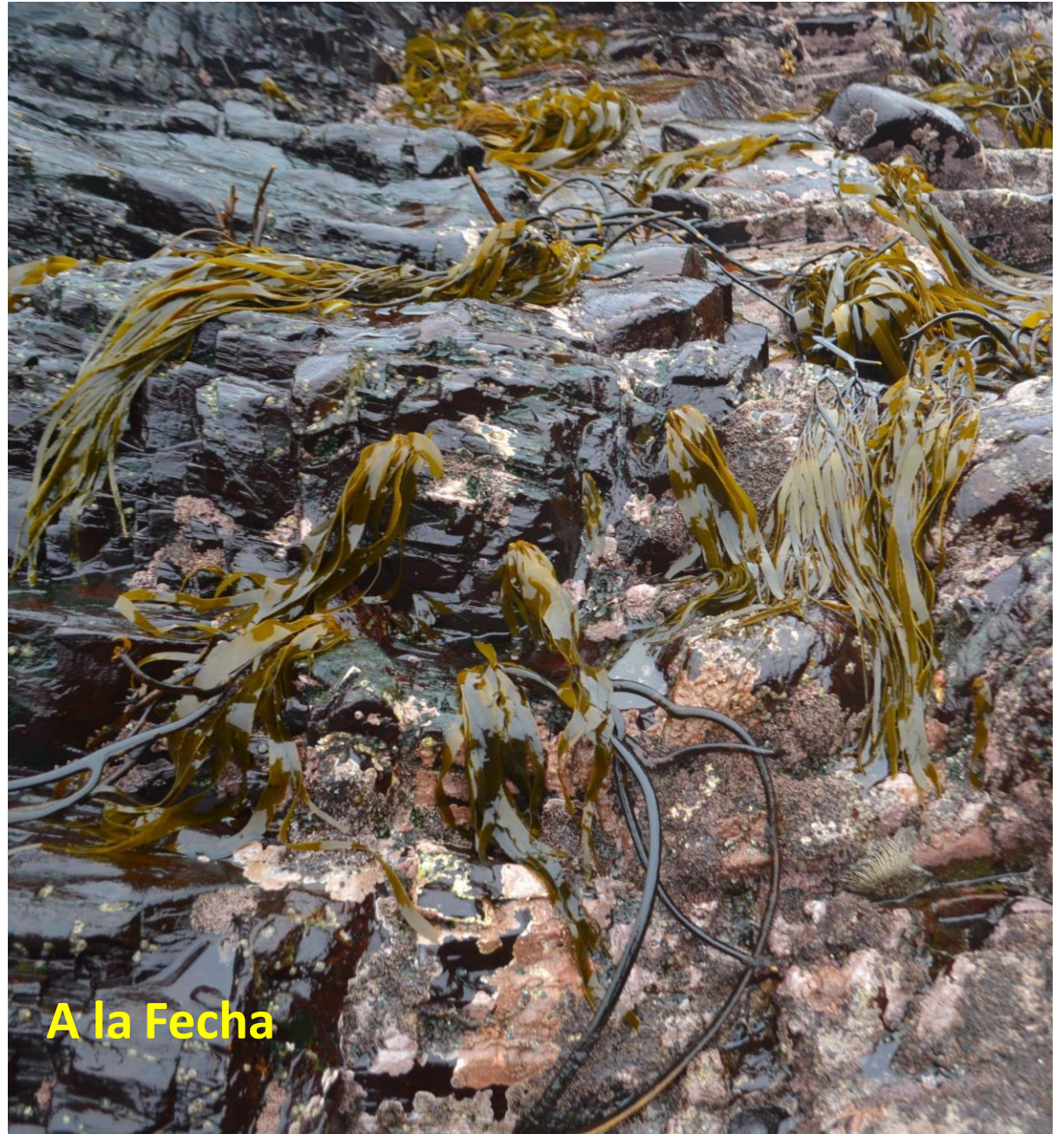
A hand is holding a large, dark brown, wavy seaweed frond. The background shows a rocky coastline with waves crashing against the rocks. In the distance, there are mountains under a clear blue sky. The seaweed is being held up, showing its length and texture. The text is overlaid on the right side of the image.

Experiencias de
repoblamiento con
Lessonia berteroana

Cultivo-vía espora-reclutas-Disco de fijación

Repoblamiento con *Lessonia berteroana* en Atacama















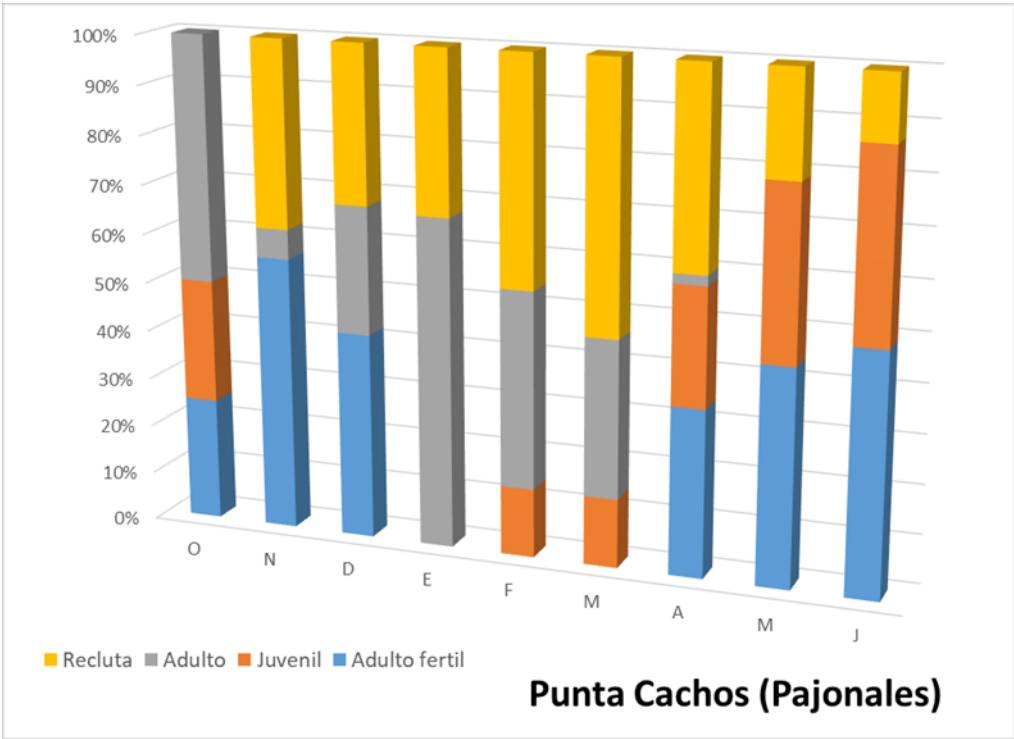
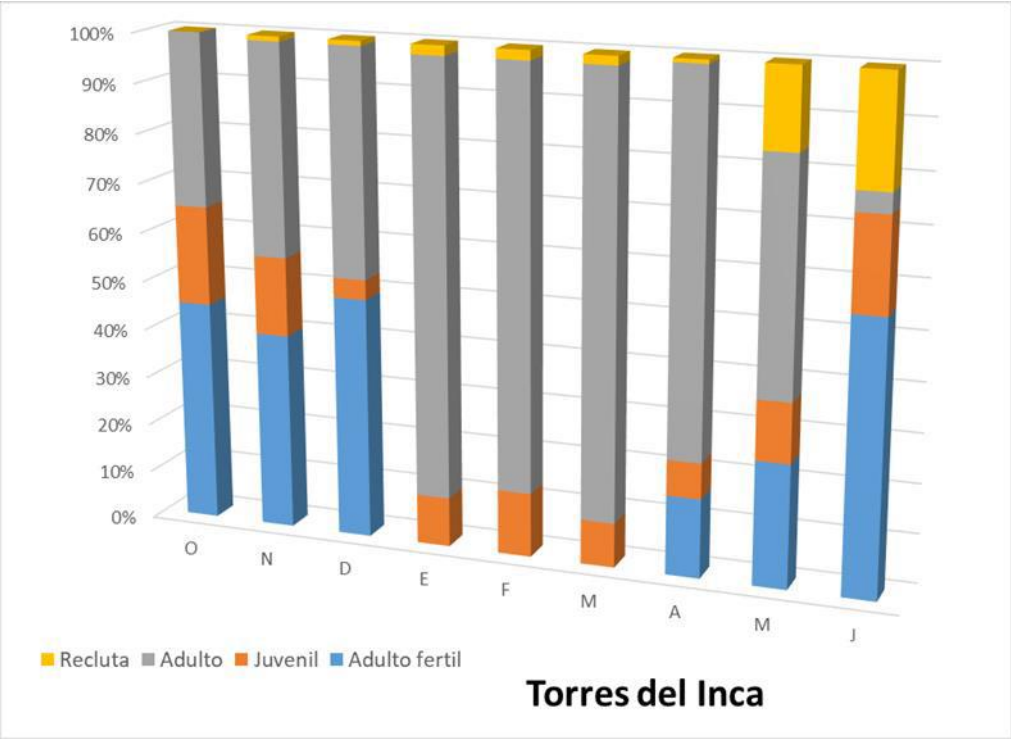








Dinámica poblacional

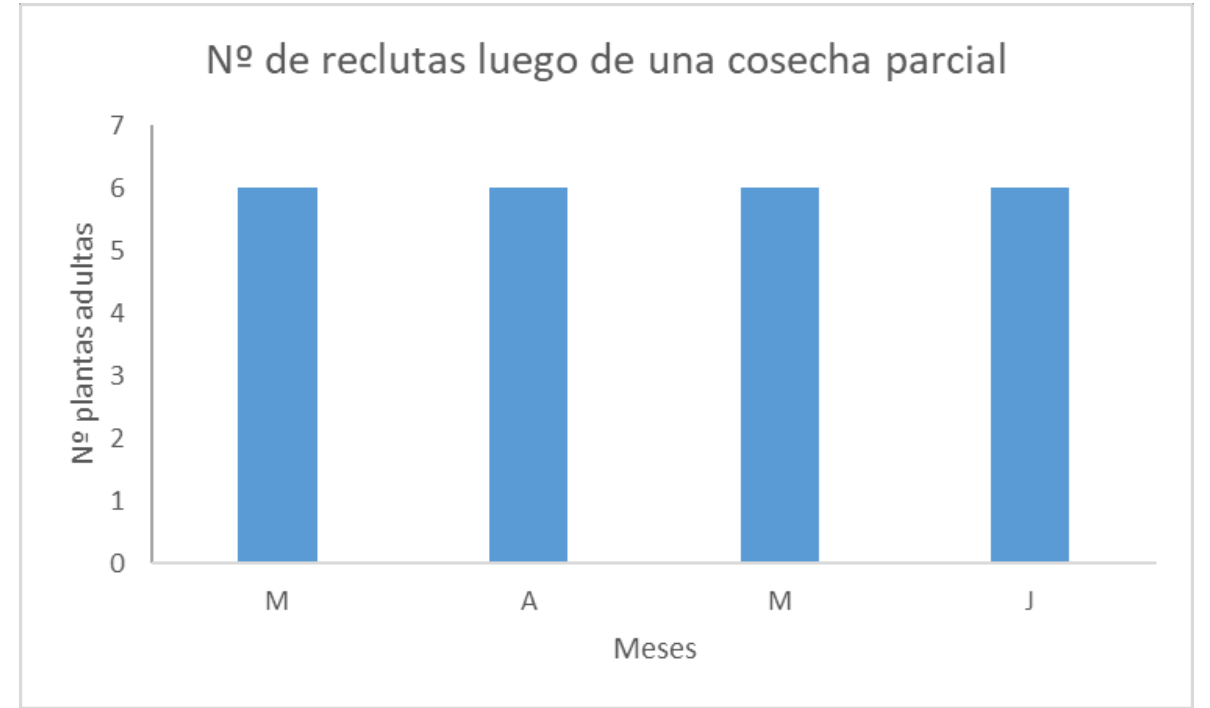
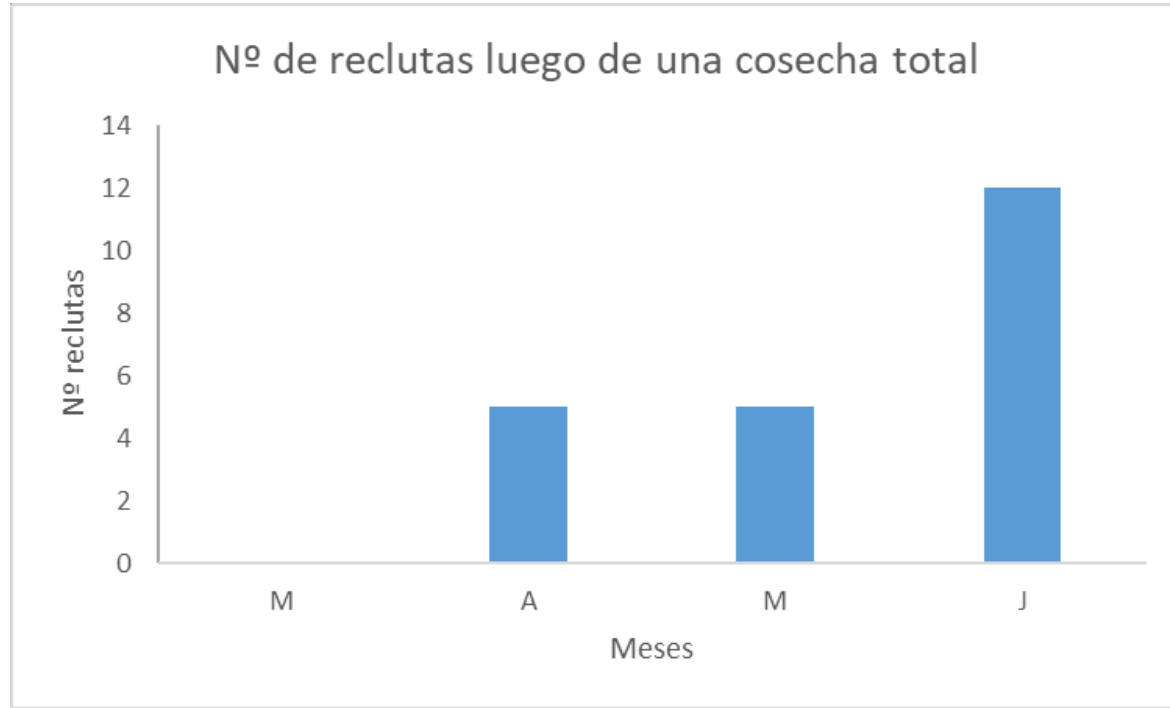


Punta Cacho (Pajonales)				
	Diam. Disco (cm)	Diam.estipe (cm)	N° Estipe	Largo (cm)
Octubre	11,5	1,3	14,9	124,7
Noviembre	9,5	1,2	14,6	119,6
Diciembre	13,1	1,4	16,4	159,7
Enero	15,4	1,5	19,0	178,9
Febrero	11,25	1,01	20,48	137,74
Marzo	10,35	0,90	20,26	129,83
Abril	11,2	0,9	22,6	147,7
Mayo	14,2	1,1	18,0	151,3
Junio	15,8	1,2	20,0	174,1

Torre de Inca				
Octubre	17,7	1,3	30,6	207,2
Noviembre	18,3	1,7	30,4	243,3
Diciembre	23,5	1,8	30,9	310,8
Enero	18,4	1,3	28,3	198,8
Febrero	19,8	1,4	30,25	211,25
Marzo	20,75	1,51	30,62	219
Abril	22,4	1,6	32,7	244,3
Mayo	12,0	0,8	21,0	129,4
Junio	13,6	0,9	23,8	154,3

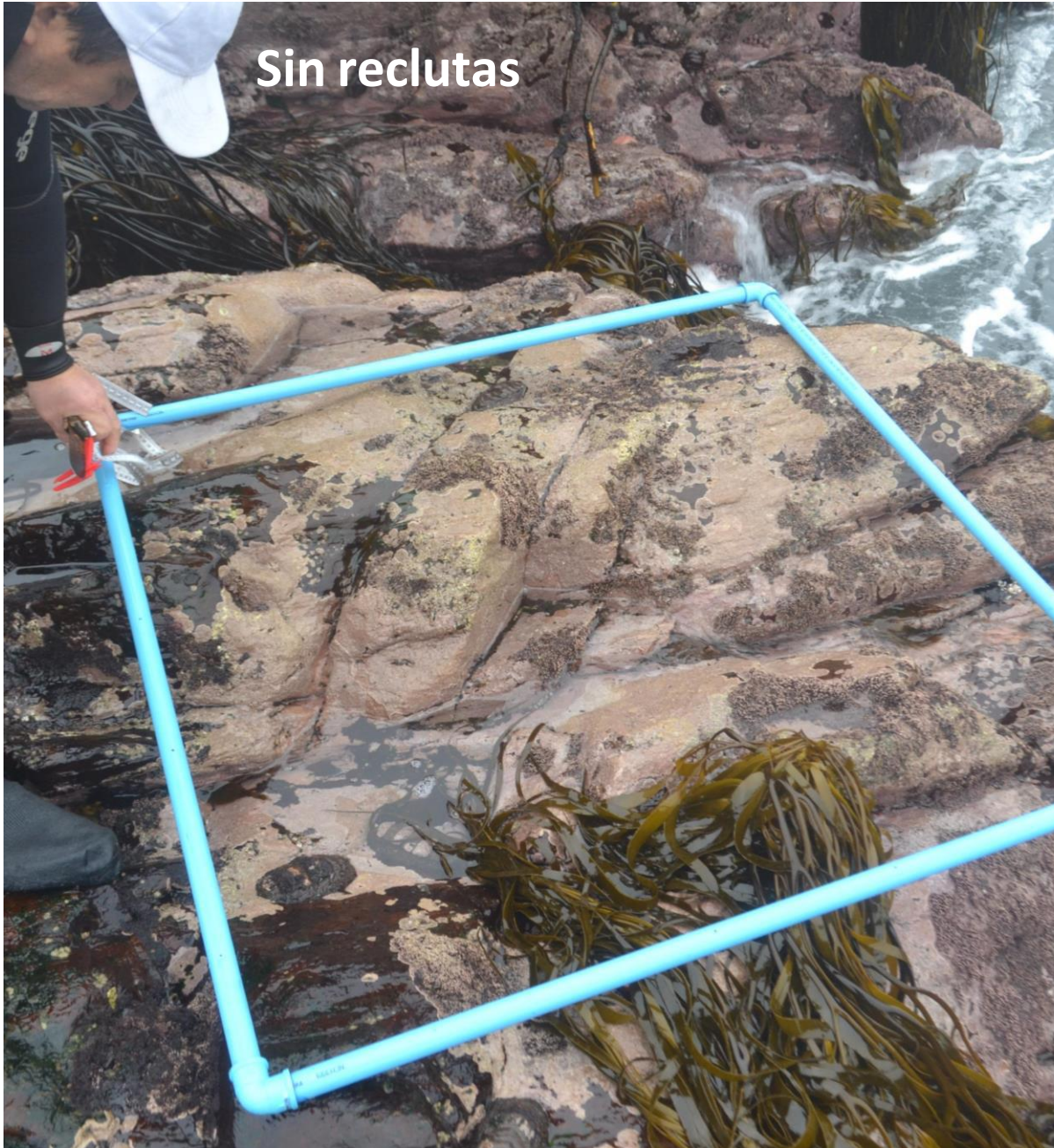


Densidad de Reclutas



No hay reclutas, se mantienen las plantas adultas

Sin reclutas



Con reclutas





Gracias