



# CIRCALGAE

Food • Feed • Cosmetic

## Seaweed harvesting and cultivation in Europe: current status and key facts



Ronan PIERRE, CEVA

Lille, Oct 26<sup>th</sup> 2023



Co-funded by the  
European Union

# CEVA – French Algae Technology & Innovation Center

- Scope:
  - Seaweed, microalgae, cyanobacteria
  - From biomass to end-products
  - Across downstream applications
- Applied research:
  - Environment, wild resources
  - Cultivation
  - Analyses
  - Product/process development
  - Formulation, food concepts
  - Scale-up
- Production and technical services
- Training, Consulting



# Seaweed harvesting and cultivation in Europe

## Current status and key facts

# Global context - a market driven by cultivation

## Volume

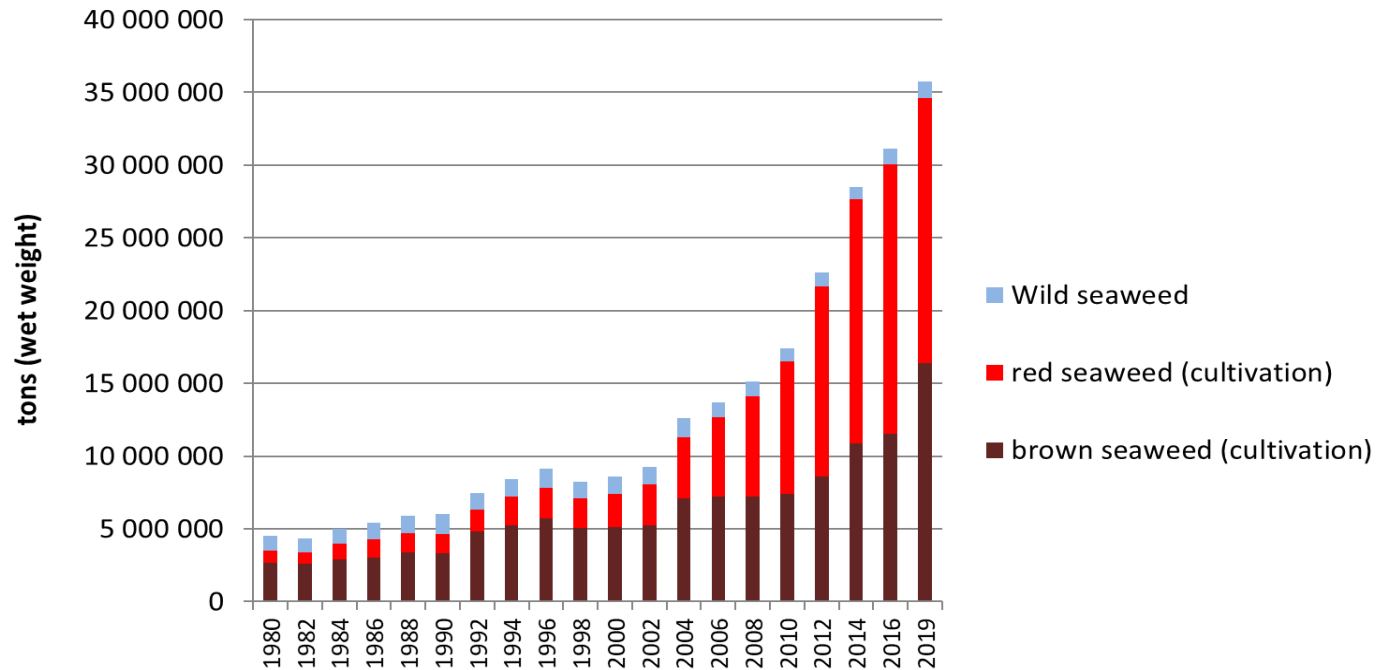
~35 million tons (fresh weight)

95% cultivation, mostly in Asia

220 species cultivated

6 genera represent 95% of production

Global Seaweed Production (FAO 2021)



Adapted from FAO 2021 - FAO Fisheries and Aquaculture Circular No. 1229



Saccharina

35.4%



Eucheuma

33.5



Kappaphycus



Gracilaria

10.5%



Undaria

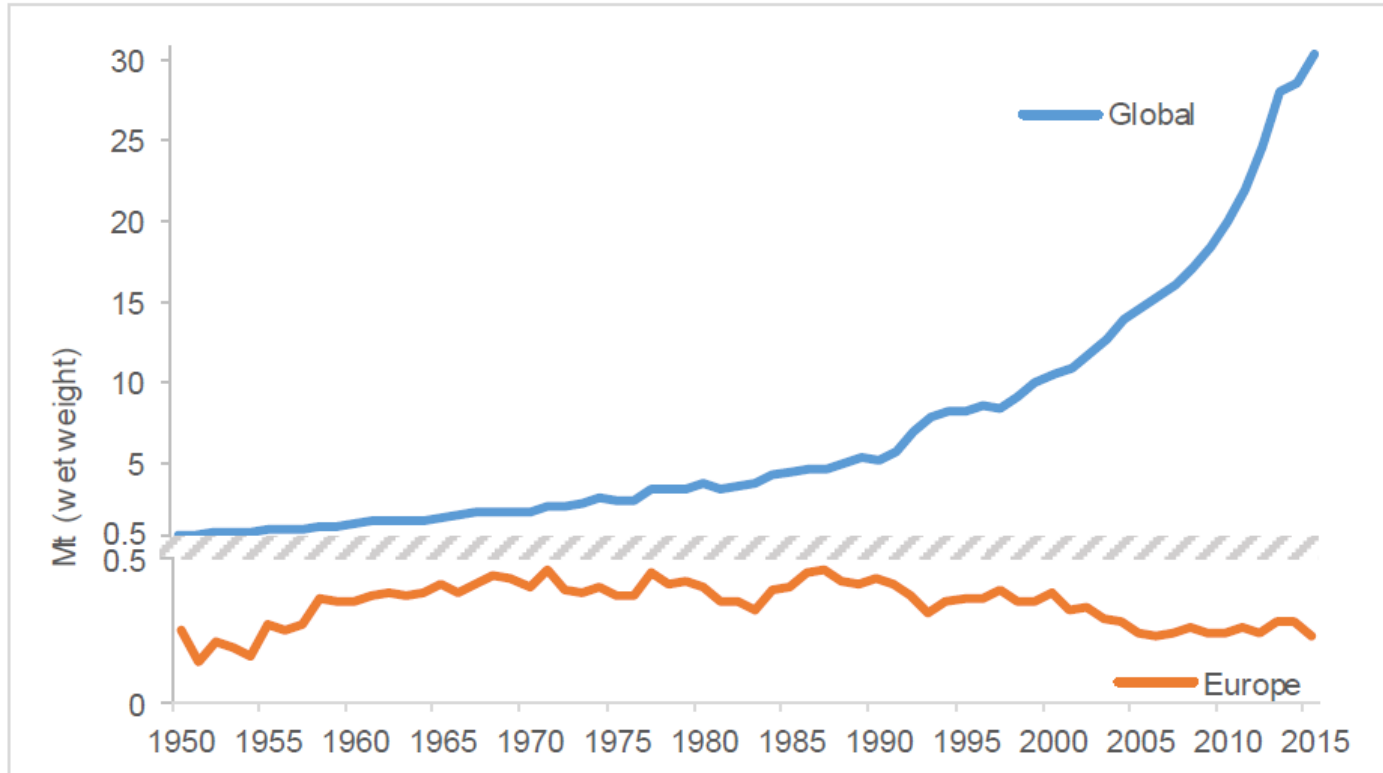
7.4%



Porphyra/Pyropia

8.6%

# European production - volumes remain limited



## Volume

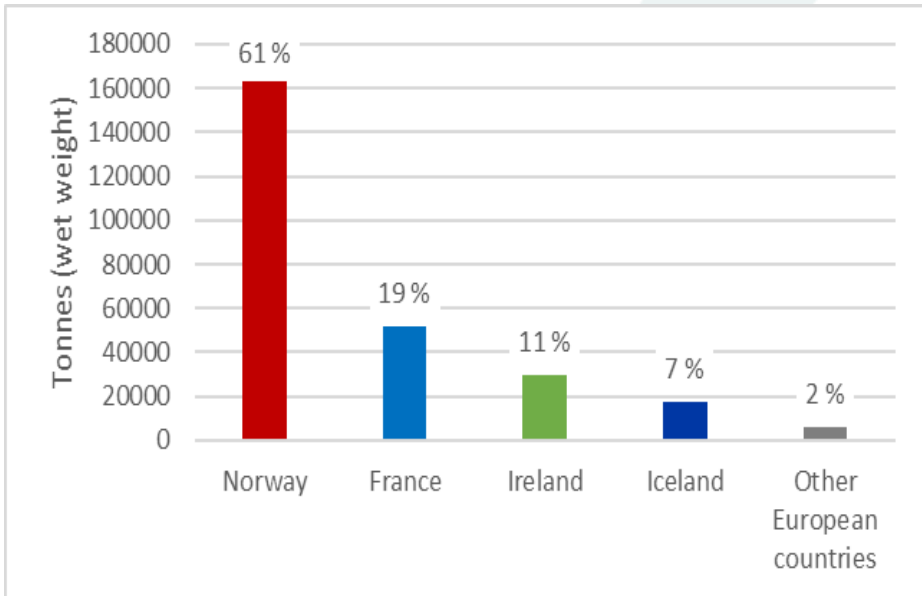
~ 300,000 tons (fresh weight)

< 1% of global production

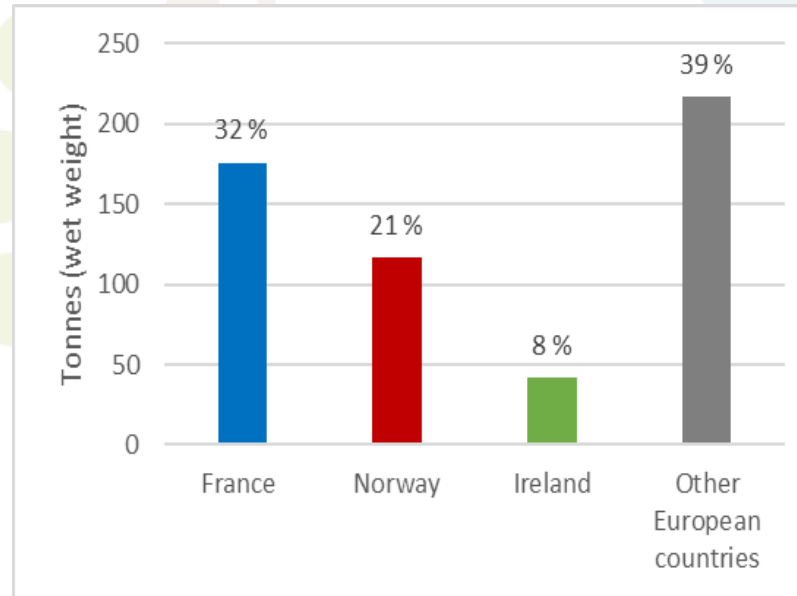
**Relatively stable** after a decline in declared volumes in the 1990s-2000s

Adapted from Camia *et al*, 2018 - *Biomass production, supply, uses and flows in the European Union. First results from an integrated assessment*

# European production – relying strongly on wild resources



European seaweed production, farmed or wild, in 2019



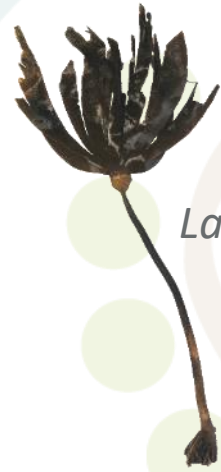
European farmed seaweed production in 2019

Still need **improved statistics**

Some countries/regions are under-represented (e.g. Scotland)

Adapted from FAO 2021 - FAO Fisheries and Aquaculture Circular No. 1229

# European production - off-shore seaweed



*Laminaria hyperborea*



*Laminaria digitata*



Two major species harvested from kelp forests by **boats**

Mostly in **Norway** (~140 kt) and **France** (50-70 kt)

Kelp fishing vessels and their harvesting gear  
Norwegian comb (top) and scoubidou (bottom)

# European production - Harvesting of other species



## *Ascophyllum nodosum*

(Norway, Iceland, Ireland, Scotland, France)  
~70,000 tons

Mostly **hand-harvesting**

On the coast at low tide or near-shore

Mostly by foot

Diving or use of small boats sometimes authorized (country/region specific)

Various markets (agriculture, food, cosmetics, ...)



## Other brown species :

*Fucus sp, Himanthalia elongata,*  
Kelp species  
(Ireland, Scotland, France, ...)  
~2,500-5,000 tons

## Red and green species :

*Palmaria palmata, Porphyra sp,*  
*Chondrus crispus, Mastocarpus sp,*  
*Gelidium sp, Ulva sp,*  
(Ireland, France, Spain, ...)  
~2,500-5,000 tons



© CEVA



# European production – drifting seaweed

Examples of harvesting of drifting species



***Gelidium***  
France, Spain

***Ulva***  
France

***Solieria***  
France

**Drifting and/or stranded**

**Main species:**

*Gelidium, Ulva, Solieria*  
+ *Pterocladia, Furcellaria, ...*

**A few thousand tons (f.w.) at maximum for each species**

Specific applications (agar, agriculture, feed ingredients, ...)

# European production – Uses of harvested seaweed

Species	Approx. volume harvested (tons fw)	Food and Supplements	Feed	Colloids and polysaccharides	Bioactives and specialty ingredients	Agriculture	Cosmetics	Biomaterials
<i>Laminaria hyperborea</i>	150,000-170,000			●			•	
<i>Laminaria digitata</i>	40,000-50,000	•		●		●	•	
<i>Ascophyllum nodosum</i>	65,000-75,000	•	●	•	•	●	•	
Hand-harvested kelp species ( <i>Laminaria</i> spp., <i>Undaria pinnatifida</i> , <i>S. latissima</i> )	500-1,000	●				●	●	
<i>Fucus</i> sp, <i>Himanthalia elongata</i>	2,500-5,000	●	•			●	•	
<i>Palmaria palmata</i>	500-1000	●					•	
<i>Chondrus crispus</i> / <i>Mastocarpus stellatus</i>	250-500	●		●			•	
<i>Ulva</i> sp	100-200	●					•	
<i>Ulva</i> sp (beach-cast/drifted)	5,000-10,000		●	•		●		•
<i>Gelidium</i> sp (beach-cast/drifted + harvesting)	5,000-10,000			●			•	
<i>Furcellaria lumbricalis</i> (beach-cast/drifted + harvesting)	1,000-2,000			●	•		•	
<i>Solieria</i> sp (beach-cast)	5,000-10,000		●			●		

●	> 50%
●	20-50 %
•	< 20 %

**CIRCALGAE D 1.1**  
Unpublished (yet)

# European production – Cultivation



Seeded lines of *Saccharina latissima* (left) and *Palmaria palmata* (right) © CEVA 2022

Land-based *Ulva* cultivation at ALGAplus, Portugal © ALGAplus

**A range of species cultivated**  
(commercial and/or research/pilot)

**Main species:**

*Saccharina latissima* (at sea)

*Alaria esculenta* (at sea)

*Ulva* sp (inland / at sea)

**Other species:**

*Undaria pinnatifida*, *Palmaria palmata*,  
*Porphyra* sp

**Still lacking precise statistics**  
**> 500 tons - growing**

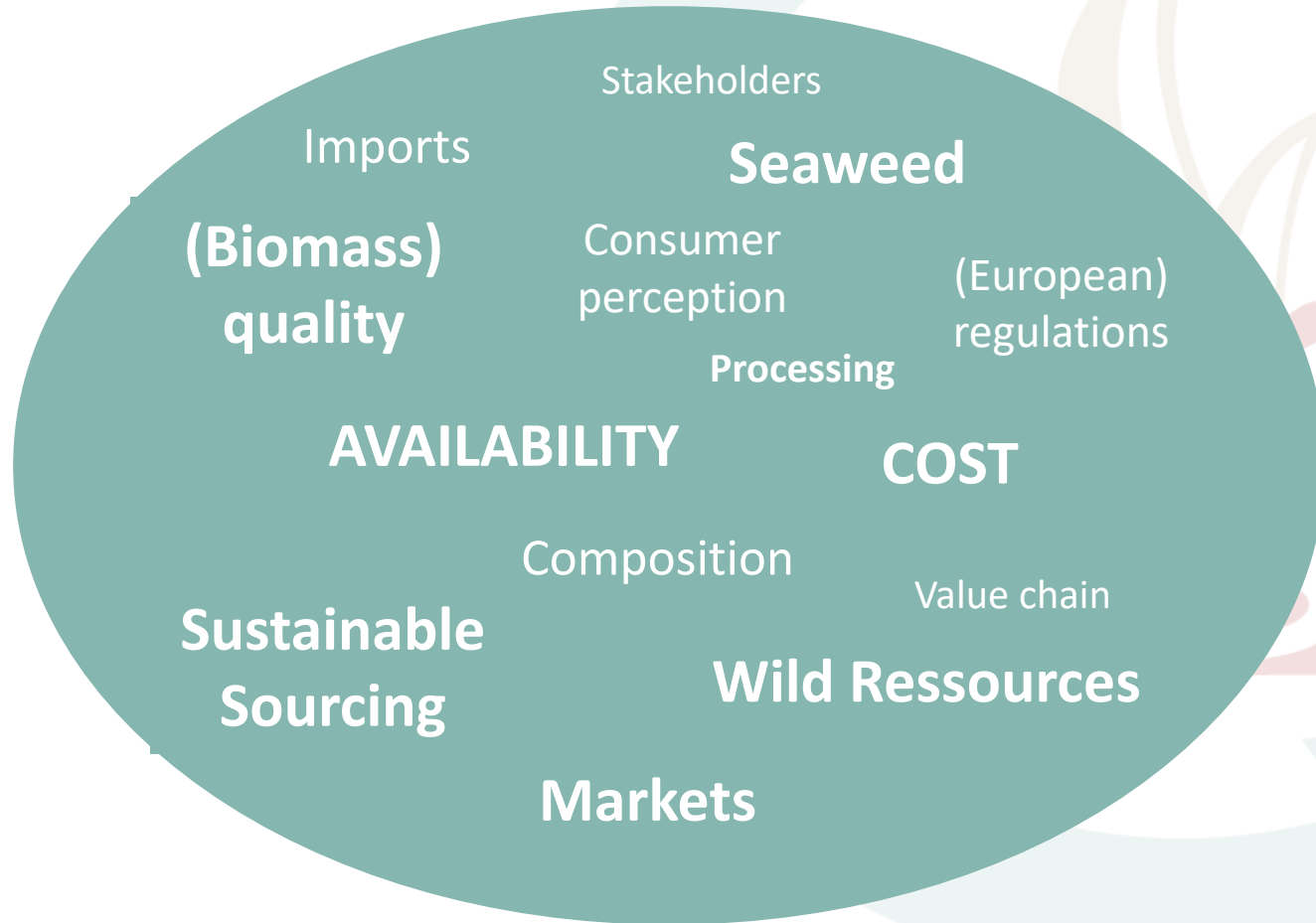
# European production – Uses of cultivated seaweed

Species	Approximative volumes cultivated (tons fresh weight)	Food (+ supplements)	Feed	Colloids and polysaccharides	Bioactives and specialty ingredients	Agriculture	Cosmetics	Biomaterials	Others
<i>Saccharina latissima</i>	500-1,000	●●	●				•	•	•
<i>Alaria esculenta</i>	200-500	●●					•		
<i>Ulva sp</i>	50-100	●●	●	•	•		•	•	
<i>Undaria pinnatifida</i>	50-100	●●			•		•		

●●	> 50%
●●	20-50 %
•	< 20 %

**CIRCALGAE D 1.1**  
Unpublished (yet)

# Cultivation or harvesting ?



**Multiple drivers** can influence (or impose) the decision