CEVA
CENTRE D'ETUDE & DE VALORISATION DES ALGUES

Opportunities and hurdles with using kelp as food, example from France







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Seaweed as food in France

19th century

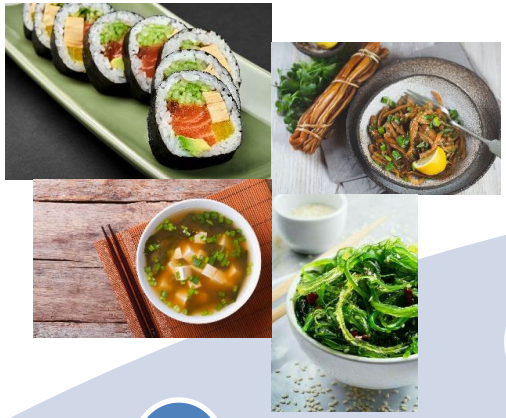
No human consumption

Raw material

20th century

1980 : start-up of edible algae

2000 : **30%** of French people had eaten seaweed during the year



21st century

2014 : **54%** of French people had eaten seaweed during the year

sushi, soups and wakame salads

2024

On-line survey : **89%** of French people had eaten seaweed during the year

New image of algae : **edible, healthy and tasty.**

Edible seaweed

Royal Kombu
(Saccharina latissima)

Alaria
(Alaria esculenta)

Wakame
(Undaria pinnatifida)

Sea spaghetti
(Himanthalia elongata)

Dulse
(Palmaria palmata)

Nori
(Porphyra sp)

Sea lettuce
(Ulva sp)

Tasty seaweed

Seaweed « tartare »

Guacamole seaweed/spices

Kombu salad on the go

French wakame salad

Seaweed salad

Umami paste

Crispy seaweed sticks

Smoked wakame

Healthy seaweed

Fermented sea spaghetti

Salt alternatives

Vegan seafood alternative

Snacks, chips

Consumer perception

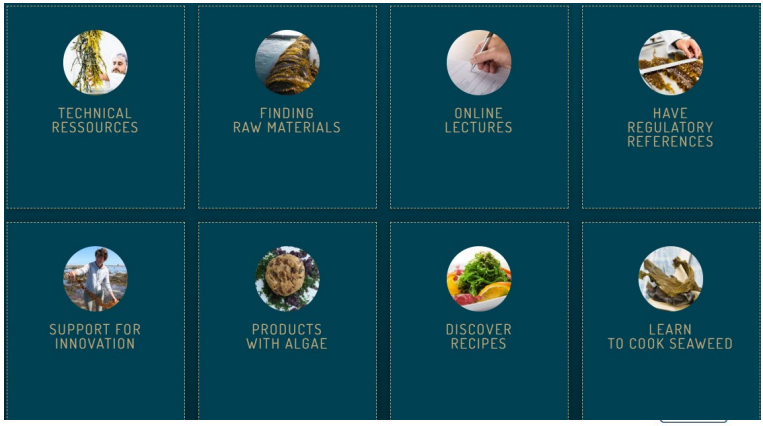
- **Positive, promising points** : local resources, nutritional benefits, alternatives to animal products, a modern world that opens up new horizons.
- But **questions remain** : gap between seaweed in its natural environment and its edible form.
- A major long-term challenge: **empowering consumers in their use of seaweed**

Seaweed in the kitchen

- Setting up a **training course** (2 days) for restaurant chefs/cuisiniers (Merci les Algues!)
- Educational activities in **culinary schools** : “Recipe inspiration booklet”
- Sensalg : **information platform** on edible seaweed

Merci les algues !

SENSALG



Contaminants : French recommendation

- Currently, French **recommendations** define maximum levels of **contaminants** for algae
- Not a regulation…
  - But these levels are considered a high guarantee for food safety
- Important cost for algae producers

	Maximum level (mg/kg DM)
Inorganic Arsenic (As)	3
Cadmium (Cd)	0,5
Mercury (Hg)	0,1
Lead (Pb)	5
Tin (Sn)	5
Iodine (I)	2 000

Maximal level of heavy metals and iodine authorized in algae (mg/kg dry matter)

Iodine

- Iodine is essential for the synthesis of thyroid hormones.
  - ≠ contaminant
  - Thyroid hormones regulate metabolism, promote growth, development and maturation of all organs, especially the brain
  - In Europe, adults and pregnant women, particularly, are at risk for iodine deficiency (Ittermann et al, 2020)

Europe (EFSA)	France Recommendation (ANSES, 2018)	Germany (Switzerland) Recommendation (BfR, 2007)
• Tolerable upper intake level for adults : **600 µg.d^{-1}** • No specific limits for seaweed	**seaweed ≤ 2000 mg.kg^{-1} DM** "risk of excess iodine intake from the consumption of seaweed"	Tolerable upper intake level for adults : **500 µg.d^{-1}** **seaweed ≤ 20 mg.kg^{-1} DM**

How to cope with iodine richness ?

Process/formulation

- Technical feasibility of reduction of iodine content demonstrated : **up to 80%** (blanching, maceration, pasteurization)
- Variety of species
- Diversity of preparation

Labelling

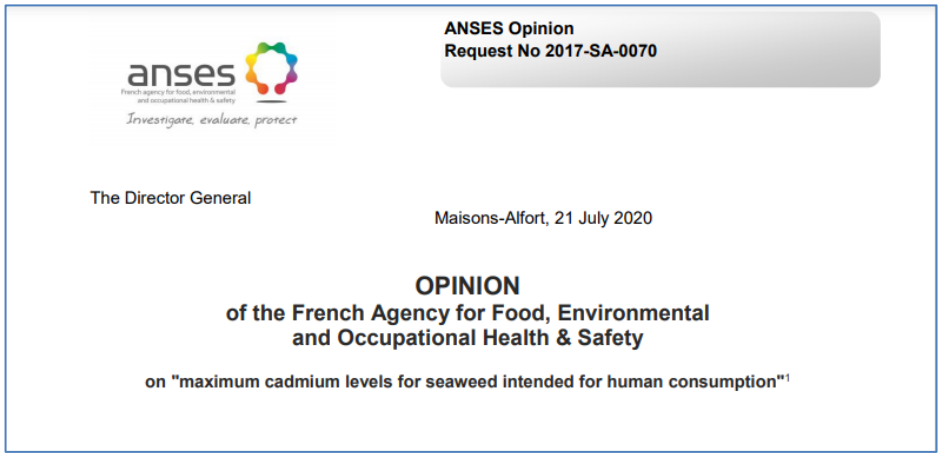
- Some recommendations
  - Iodine content on the package
  - Portion indication
  - German recommended text (BfR, 2007) *" Iodine-rich food. Excessive iodine intake can be harmful to health and lead to disorders of thyroid function and iodine metabolism."*

Species of concern : *Laminaria digitata, Saccharina latissima, Gracilaria sp.*

Cadmium

In 2020 : ANSES recommends **to limit cadmium exposure** from the consumption of seaweed

- setting the **lowest** possible maximum cadmium concentrations in edible seaweed
- Proposing a **maximum cadmium level of 0.35 mg/kg** DM in edible seaweed !
- **conducting a new survey** to collect more data on edible seaweed consumption habits in France



anses
French agency for food, environmental and occupational health & safety
Investigate, evaluate, protect

ANSES Opinion
Request No 2017-SA-0070

The Director General

Maisons-Alfort, 21 July 2020

OPINION
of the French Agency for Food, Environmental and Occupational Health & Safety

on "maximum cadmium levels for seaweed intended for human consumption"[1]

≠

Regulation (CE) N° 2023/915
Cadmium level

Seaweed food supplement < 3 mg/kg
Mollusc (fresh) < 1 mg/kg

Species of concern: *Porphyra sp., Alaria esculenta (Fucus, Himanthalia elongata, Undaria pinnatifida*)

How to cope with Cadmium content ?

Process ?

- Fresh water soaking treatment/blanching **failed** to reduce Cd
- High salinity treatment (in 2.0M NaCl) reduces Cd content (Stevant, 2019)
  - But strongly affects **product quality** (3-fold increase in Na)

Health risk ?

- Cd bound to dietary fibers (alginate): presumably low bioavailability
- Main contributor to cadmium exposure : bread products, potatoes and vegetables (ANSES, 2011)
- Portion of ingestion of seaweed : **low contributor (Ficheux et al, 2023)**

Chambre Syndicale Algues & Végétaux Marins

Seaweed as food in France

- Creative and **dynamic market**, new starts-up
- Development of **« ready-to eat » products** : salads, snacks, european « asiatic products »
- To support algae as food, we need :
  - More seaweed ! Development of seaweed aquaculture (off-shore, in-land)
  - More studies of stabilization process and impact on nutritional composition
  - Harmonizing EU regulation on contaminants
    - Simplifying procedures across Member States
    - Risk assessment study on **algae portion size**

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