Aspects related to the use of Sacharina Latissima seaweed and Fish protein hydrolysate uses in bakery products in Romania

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SuMaFood

Sustainable preservation of marine biomasses for an enhanced food value chain

Background

- The Blue Bioeconomy Strategy is part of EU's ambition to increase the use of marine resources to make products, such as novel foods and additives, animal feeds, and nutraceuticals, but also pharmaceuticals and cosmetics.

- However, there is a significant potential for improvements in the marine food supply systems, since fish and other seafood constitute the commodity group with the second largest food losses and waste at 35%. An improvement of the supply systems, e.g., by waste reduction and full utilization of the biomasses, will therefore be a valuable contribution to advancing the blue bioeconomy towards increased sustainability and competitiveness.

SuMaFood addresses **innovative utilization of marine biomasses and by-products** and will demonstrate how such resources can be made available and attractive to the consumers, thus adding value to the biomass food chain. The goal is to increase the use of raw materials, extend product ranges, and to provide unique products in a growing marine food chain.

Enhanced food production from marine biological resources will contribute to **reduced pressure on land resources for agriculture**, mitigate climate change, and enable future food security and sustainability. In addition, there are several nutritional and health benefits from marine food due to the high level of proteins, omega-3 fatty acids and vitamins.

Energy
Digitalisation
Health and well-fare
Industry and infrastructure
COMPETITIVE STRENGTH
Climate, environment, oceans
SOCIETAL SOLUTIONS
Smart and secure societies
Food
Work and productivity
Mobility

WP4 Quality Assessment and Market Approval

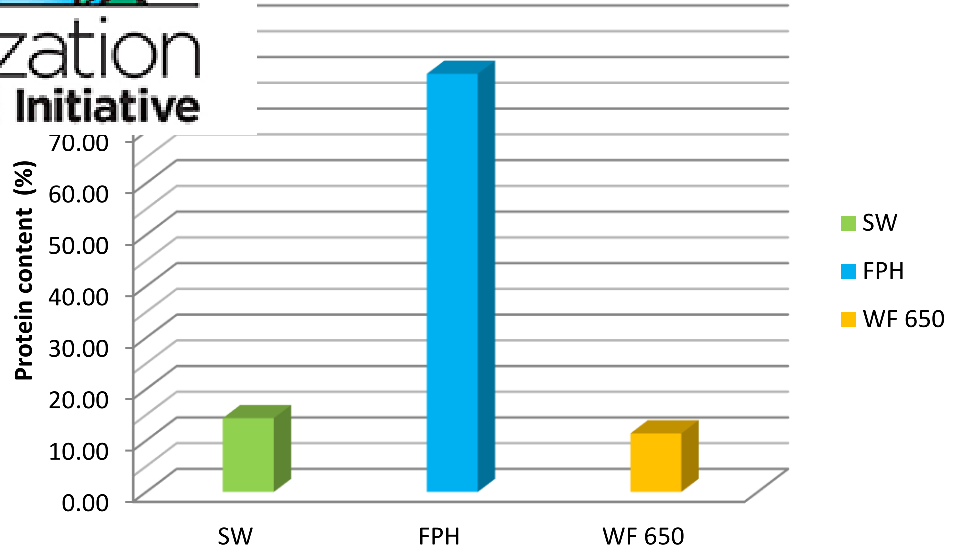
Transilvania University of Brasov processed the seaweed and fish protein powder received from WP3, in two directions:
- For microbiological and nutritional assessment
- Design and development of novel food products with functional properties by direct integration of powders into recipes of bakery products.

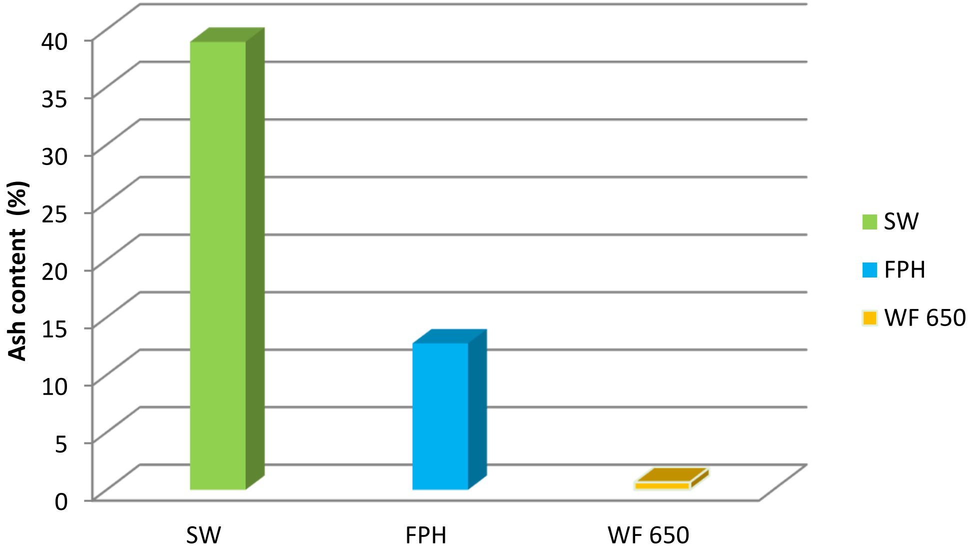
- T4.1: Microbiological and nutritional analyses (m 6.-m 10.)
- T4.2: Development of bakery products (m 12.-m 16.)
- T4.3: Sensory studies of the bakery products (m 12.-m 18.)
- T4.4: Shelf-life testing of bakery products (m 14.-m 20.)

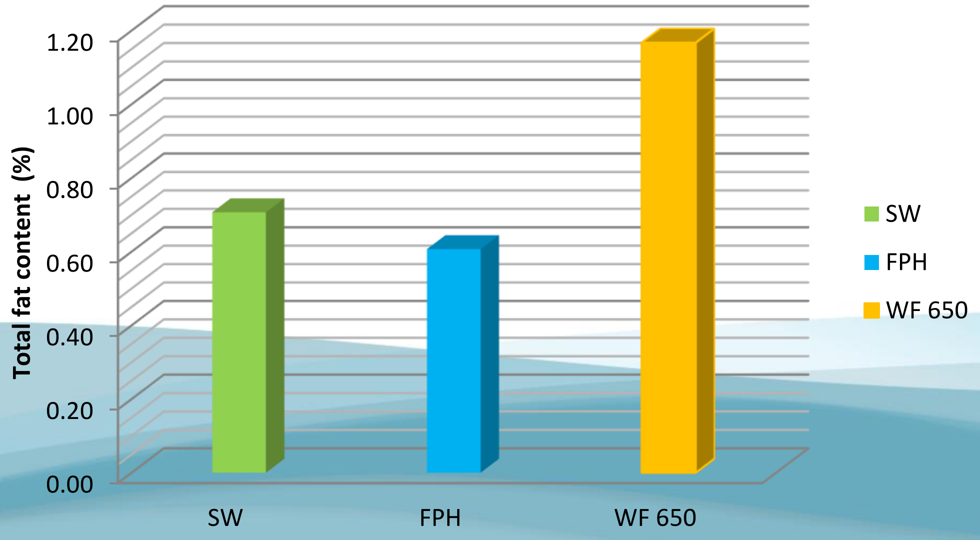
Methods for chemical and nutritional analysis

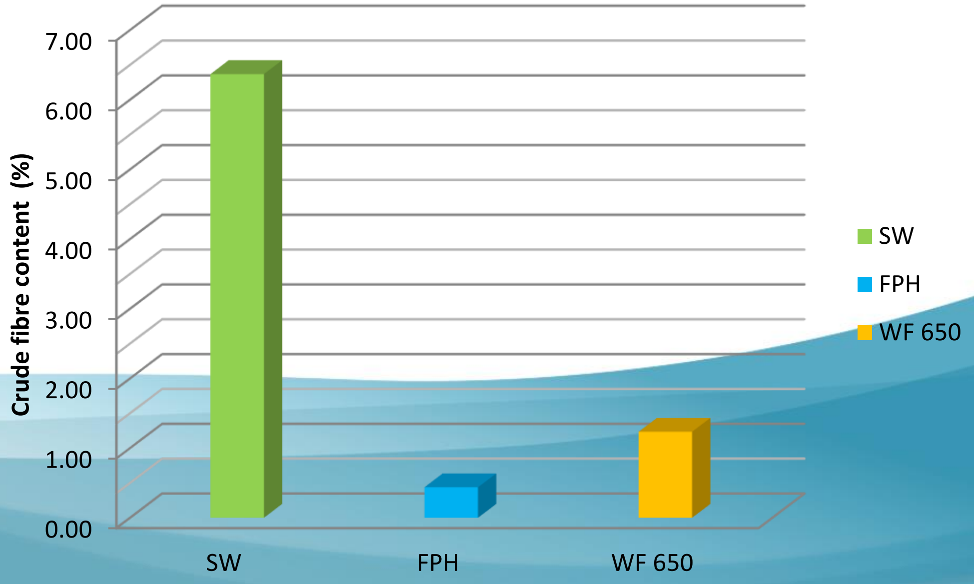
Moisture content analysis	*Mettler LJ 16 thermobalance*
Ash content determination	*Thermo-adjustable electric oven, "Nabertherm"*
Protein content analysis	*a. Tecator Digestor Auto mineralization unit* unit *(Foss, Hilleroed, Denmark)* *b. Tecator Scrubber gas scrubbing unit (Foss, Hilleroed, Denmark)* *c. Kjeltec 2300 analysis distillation system (Tecator, Hoganas, Sweden)*
Determination of total fat content	*Soxhlet extraction*
Determination of total sugar content	*Modified Luff-Schoorl method*
Determination of total sodium chloride	*Mohr method*
Crude Fiber Content Analysis	*Fibretherm-Gerhardt equipment*
Mineral Content Analysis	*Optimal emission spectrometry with inductively coupled plasma (ICP-OES)* *Optima 8300 Optical System and SCD Detector*
Determination of antioxidant activity using DPPH	*DPPH method (Trolox as standard)*

Global Harmonization Initiative
Advocating science-based food safety law and trade









JPI OCEANS

T4.2: Development of bakery products (m 12.-m 16.)

T4.3: Sensory studies of the bakery products (m 12.-m 18.)

- **New product formulation based on seaweed flour / FPH substitution:**

  ✓Bakery products: 1,5% , 3%, 4,5%, 6% Sugar Kelp / FPH substitution;

  ✓ Salty snack products: 2%, 3%, 4% Sugar Kelp / FPH substitution (with cumin seed addition), 6% Sugar Kelp substitution (with cumin and flaxseed addition);

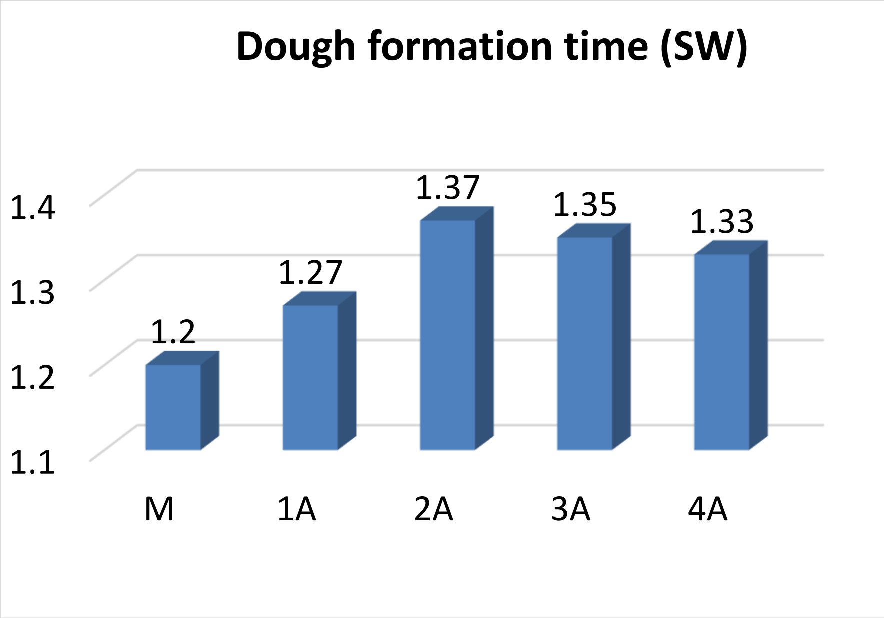
  ✓ Sweet biscuits: 3% and 6% Sugar Kelp / FPH substitution;

  ✓ Pasta products: 3% and 6% Sugar Kelp / FPH substitution;

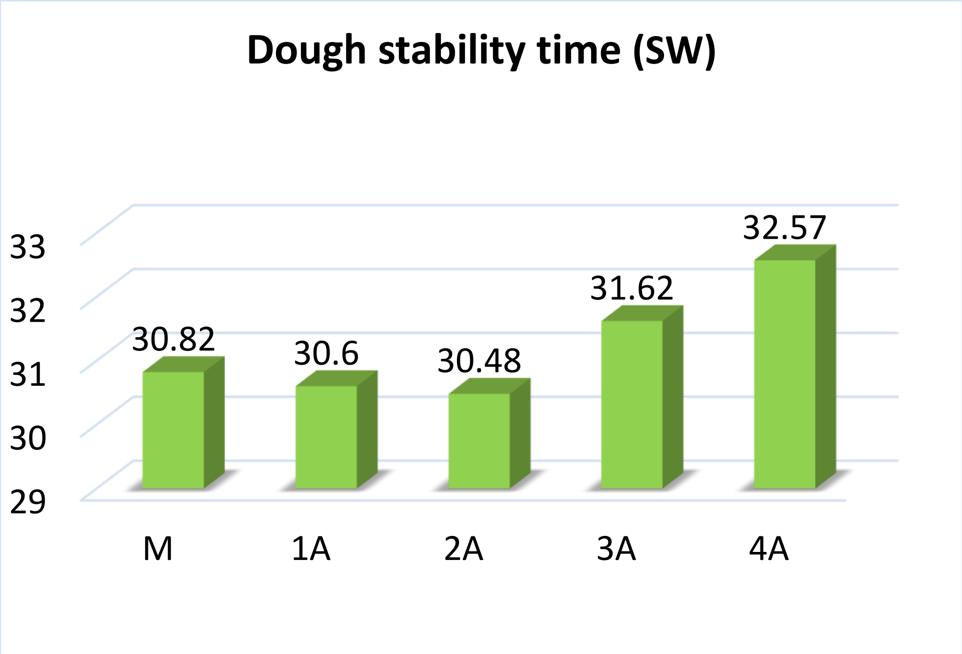
gical and enzymatic behaviour of wheat flour mixtures aweed

- The rheological behaviour of the dough of the studied flour samples was analysed using the "Chopin+ Protocol" of this device. It uses the standardized protocol ICC No. 173 for a complete characterization of the rheological behaviour of flour (protein network, starch and enzyme activity)

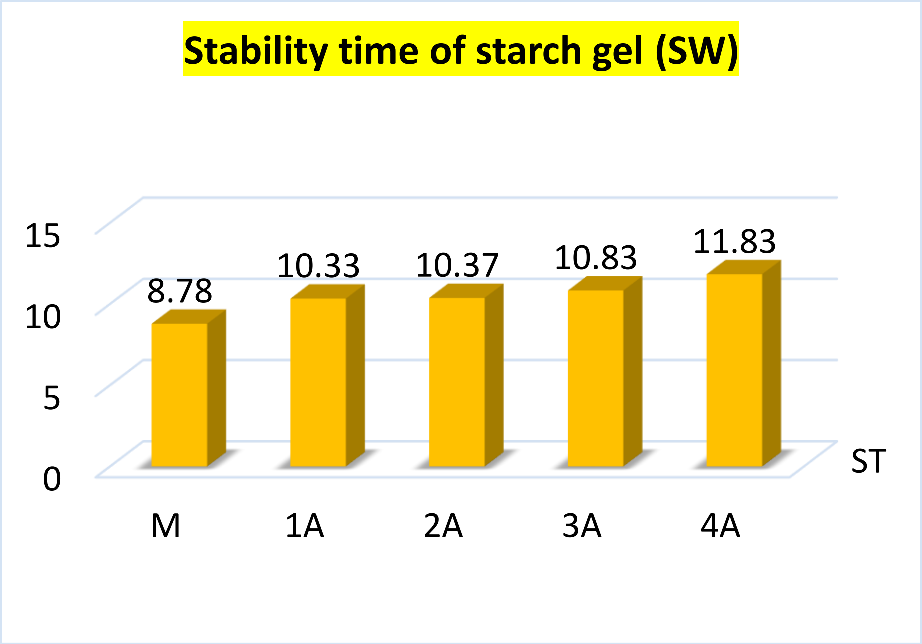
Coding of experimental samples of wheat flour with the addition of seaweed flour (SW)	
M	100% wheat flour
1 A	98.5 % wheat flour + 1.5 % seaweed flour
2 A	97% wheat flour + 3 % seaweed flour
3 A	95.5 % wheat flour + 4.5 % seaweed flour
4 A	94% wheat flour + 6% seaweed flour



Dough formation time (SW)
1.4
1.3
1.2
1.1
1.2
1.27
1.37
1.35
1.33
M
1A
2A
3A
4A



Dough stability time (SW)
33
32
31
30
29
30.82
30.6
30.48
31.62
32.57
M
1A
2A
3A
4A

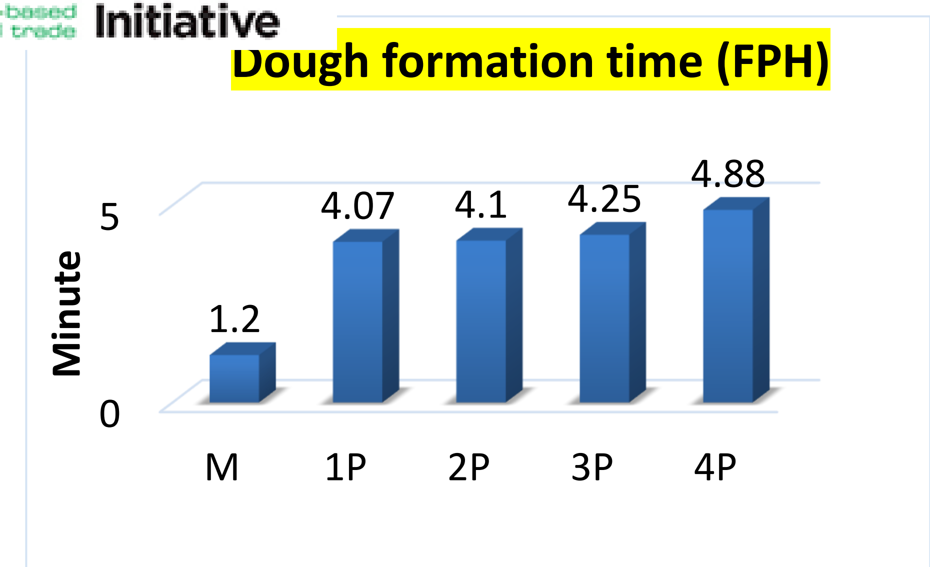


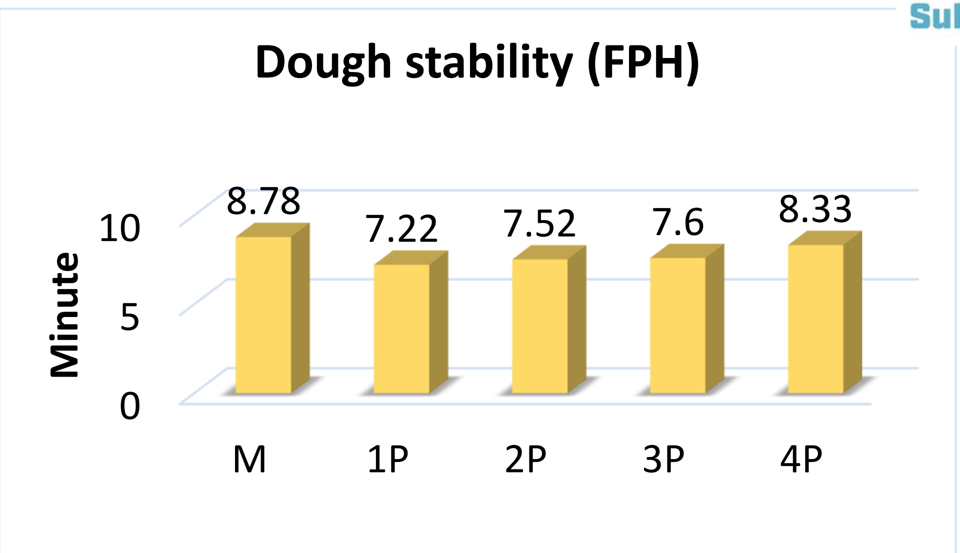
Stability time of starch gel (SW)
15
10
5
0
8.78
10.33
10.37
10.83
11.83
ST
M
1A
2A
3A
4A

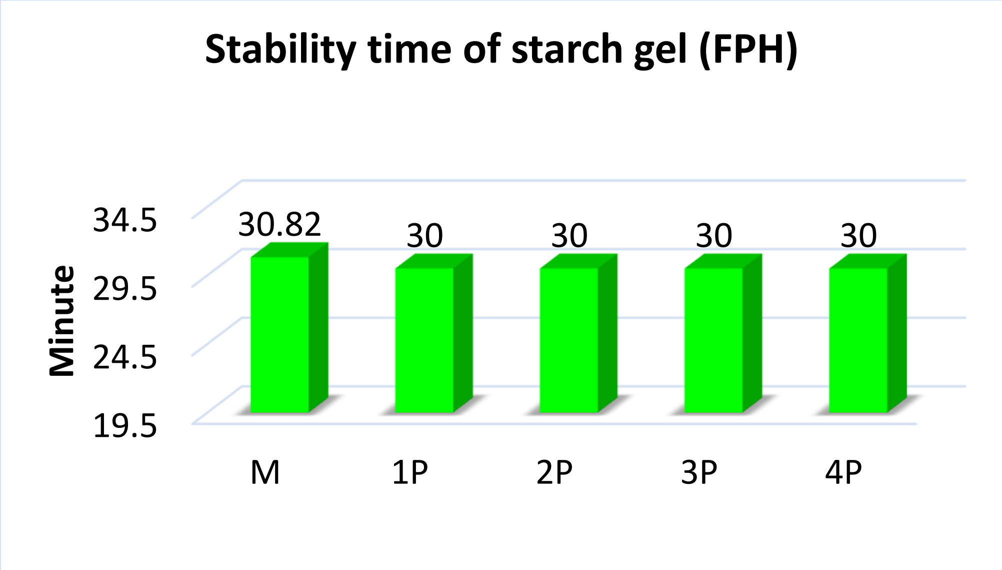
Rheological and enzymatic behaviour of wheat flour mixtures with hydrolysed fish protein

- The rheological behaviour of the dough of the studied flour samples was analysed using the "Chopin+ Protocol" of this device. It uses the standardized protocol ICC No. 173 for a complete characterization of the rheological behaviour of flour (protein network, starch and enzyme activity)

Coding of experimental samples of wheat flour with addition of fish protein hydrolyzate (FPH)	
M	100% wheat flour
1 P	98.5 % wheat flour + 1.5 % fish protein hydrolyzate
2 P	97% wheat flour + 3 % fish protein hydrolyzate
3 P	95.5 % wheat flour + 4.5 % fish protein hydrolyzate
4 P	94% wheat flour + 6% fish protein hydrolyzate


Dough formation time (FPH)
Minute
5
0
1.2
4.07
4.1
4.25
4.88
M
1P
2P
3P
4P


Dough stability (FPH)
Minute
10
5
0
8.78
7.22
7.52
7.6
8.33
M
1P
2P
3P
4P


Stability time of starch gel (FPH)
Minute
34.5
29.5
24.5
19.5
30.82
30
30
30
30
M
1P
2P
3P
4P

T4.2: Development of bakery products (m 12.-m 16.)

800kg/24h semi-industrial bakery line

Flour siever SF 100

Dough mixer type SILVER 50

Divider SQ 20

Dough rounding eq. type T1

Long shape modelling eq. type RO-CR-600

Dough fermenter eq. model TELBO

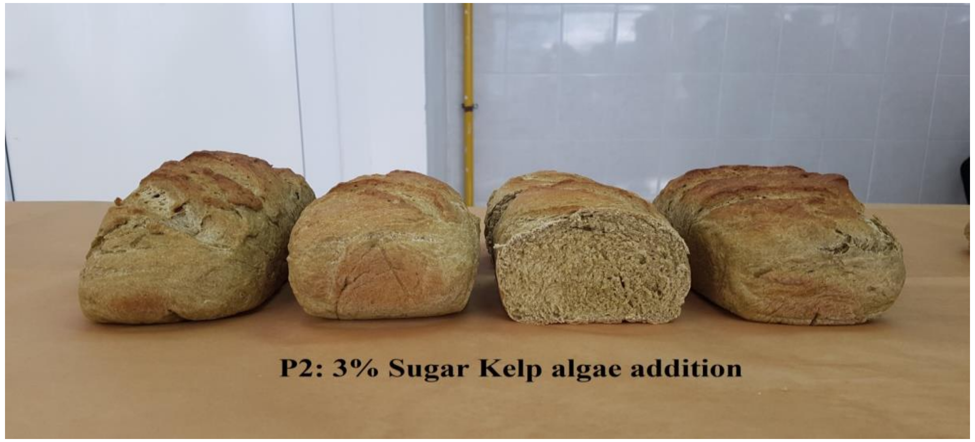
Oven MSR 4

Baking tests to obtain the seaweed bread product

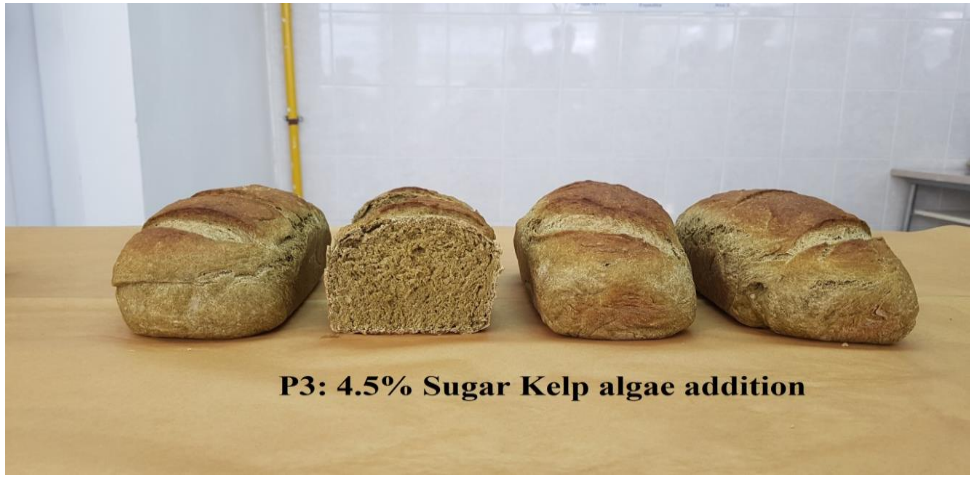
M	100% wheat flour
1A	98.5 % wheat flour + 1.5 % algae flour
2A	97% wheat flour + 3 % algae flour
3A	95.5 % wheat flour + 4.5 % algae flour
4A	94% wheat flour + 6% algae flour

P0: control sample (100% wheat flour - type 550)

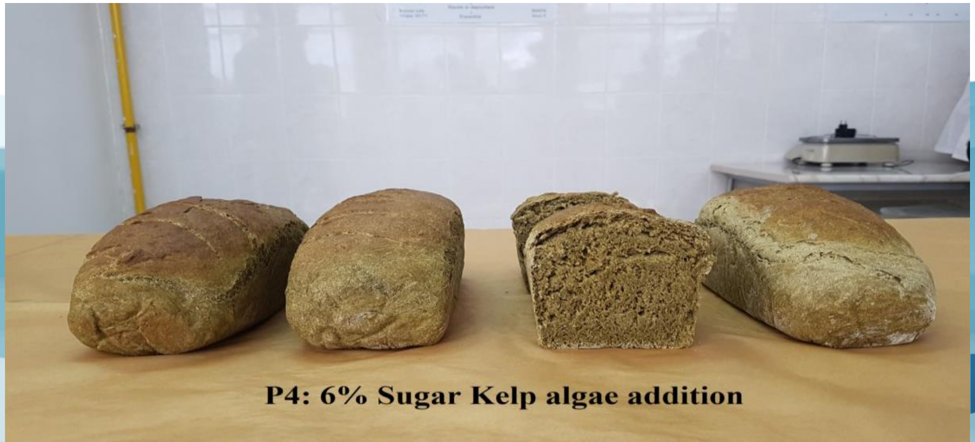
P1: 1.5% Sugar Kelp algae addition



P2: 3% Sugar Kelp algae addition



P3: 4.5% Sugar Kelp algae addition



P4: 6% Sugar Kelp algae addition

Compatibility with other food products or drinks (consumer feedback)

- Sushi;
- Used as brusketta with olive oil and tomatoes;
- In combination with different types of cheese;
- As an appetizer with fish egg salad, or eggplant salad, or as a replacement of Lebanese pita;

https://docs.google.com/forms/d/1oNd_XUPAtOsTPKXxVxtIjfEBEBXvIKwHTou0dcxiXkI/edit#responses

Salty snack products with addition of Sugar kelp

Wheat flour

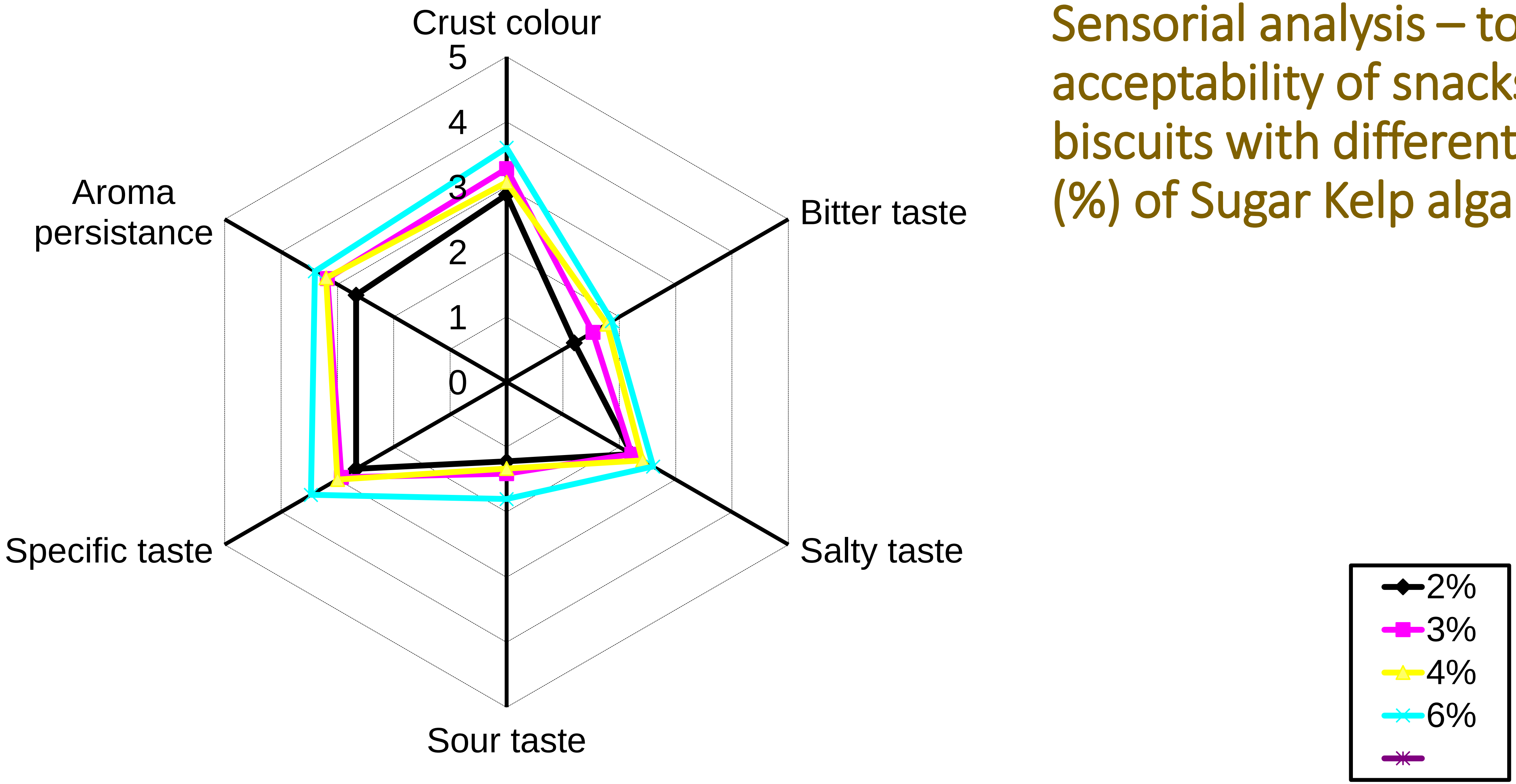
- Wheat flour type 480;

Sugar Kelp flour

Pastry products with addition of Sugar kelp

Biscuits

Different shapes of biscuits, powdered with sugar + 3% Sugar Kelp substitution



Sensorial analysis – total acceptability of snacks and biscuits with different additions (%) of Sugar Kelp alga

Pasta products with addition of Sugar kelp

Pasta	Different shapes of pasta (lasagna, fettuccini, etc) + 3% Sugar Kelp substitution

Pasta products with addition of Sugar kelp

Pasta

Different shapes of pasta (fettuccini, noodlesetc) + 3% and 6% Sugar Kelp substitution

Baking tests for the bread products with Fish Protein Hydrolisated

M	100% wheat flour
1 P	98,5 % wheat flour + 1,5 % FPH
2 P	97% wheat flour + 3 % FPH
3 P	95,5 % wheat flour + 4.5 % FPH
4 P	94% wheat flour + 6% FPH

New product formulation based on fish protein powder:

- ✓Salty snack products with addition of 6% hydrolyzed salmon fish protein (with and without cumin seed addition);
- ✓ Sensorial analysis;

Salty snack products with addition of hydrolyzed cod fish protein

Salty snacks with 6% hydrolyzed cod fish protein with and without cumin seeds

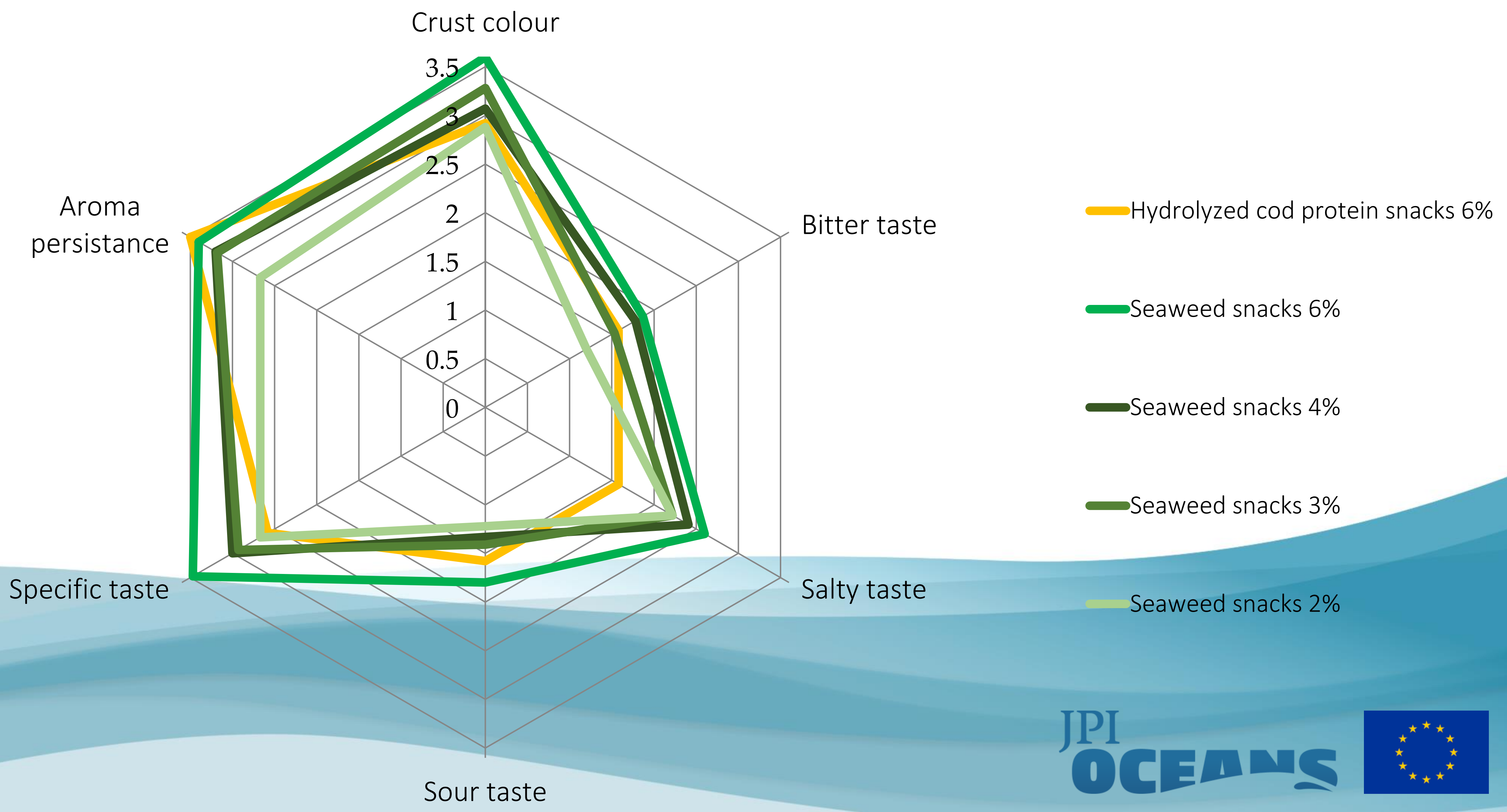
Wheat flour
- Wheat flour type 480;

Hydrolyzed fish protein
- Hydrolyzed salmon fish protein 6% addition.

Cumin seeds
- 2 types of salty snacks were made, with and without cumin seeds in order to reduce the after taste.

Health claims
- Aim: health claims according to the **Reg. No 1924/2006**

Sensorial analysis – of salty snack products with addition of 6% hydrolyzed fish protein in comparison with salty snack with different substitution levels of seaweed



Compatibility with other food products or drinks (consumer feedback)

- Dairy products, especially cream cheese and yogurts;
- Used instead of bread for guacamole souce, cream cheese, butter, etc;
- In combination with different types of drinks, like beer or wine;
- It is very similar to a specific Romanian kind of salty snack, but wich is with cheese flavour.

- https://www.iufost.org/ - The International Union of Food Science and Technology (IUFoST) supports programmes and projects to increase the safety and security of the world's food supply. **October 31 - November 3 2022** in Singapore

Thank you for your attention!