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SPIRULINA FOOD PREPARATION STUDY : IDENTIFICATION OF NEW TECHNICAL POSSIBILITIES AND PROCESS IMPROVEMENTS

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I Introduction

In this second work package, our mission was double:

- To have a preliminary reflexion concerning the evaluation criteria that could help to select the best suited recipes
- To analyse possible ways to improve the recipes : new technical possibilities and process improvements

II METHODOLOGY: MAIN CRITERIA FOR RECIPES EVALUATION

Our working methodology has been based on the following points:

- We have selected several types of dishes, one of each type described in WP1 (except those including fish, meat or eggs which are not available in the base: 9 types of dishes suitable to cover all the meals of a whole day have been selected.

- We have taken into account the principal ingredients, which will be available: corn, rice, soya, potatoes, onions, spinach, tomato, and lettuce.
The dairy products (milk, butter...mentioned into the original recipe) have been replaced by substitutes obtained from soya. The soya oil was the only oil taken into account.
The variety of the recipes is thus strongly reduced.

- To have a first evaluation of recipes, we have selected four criteria to build up an evaluation chart:
 - Nutritional value of food: we focused on calories and proteins primarily
 - Preparation time
 - Energy consumption for meal preparation
 - Sensorial acceptability

* **Nutritional value:** this is the first function of food, we have schematically evaluated the nutritional values of the prepared dishes starting from the available nutritional data base. As the aim is to develop crops well suited to feed the crew, we focus on the nutritional content mainly calorie and protein content, not taking into account, at that first level, the nutritional equilibrium of the diet which can be adjusted at a second level.

* With regard to the **preparation time**, we only took into account time necessary to the preparation starting from the ingredients considered as available. Time necessary to the manufacture of semi-finished products, for example flour, soya oil... etc was not taken into account

* **Energy:** Energy consumption is probably the main cost intern of “mass equivalent” . We very roughly evaluated the energy of cooking: we took the hypothesis of well insulated cooking systems which consumes the necessary energy to raise the temperature of the ingredients to 80°C or 100 °C and took twice the value obtained to take into account the cooking itself.

* **Sensorial acceptability:** During the mission, we did not realise any consumer taste evaluation however, sensorial acceptability (aspect, smelling, taste and texture) is obviously an important criteria and would have to be quoted for each selected recipe. It will be necessary to analyse specific consumer acceptability for long term mission. Let us add here that spirulina is not easy to consume when the level of incorporation is significant: traditional recipes mainly propose “spicy “dosis of spirulina

Each of these four criteria would have specific analysis to quote each recipe: in this we just give a first evaluation of the different recipes, according to available data.

This first approach will allow to have a first evaluation of the methodology and of the works which have to be performed.

- For each case, we indicated the **technological alternatives** which would be necessary to analyse to improve the acceptability of the recipe

- In a third paragraph, we will work on the daily diet, to have an evaluation of the total spirulina ingestion corresponding to different menus.

- in the fourth paragraph, we conclude on the main technological alternatives which could be worth to explore.

III FIRST EVALUATION OF RECIPES

III.1 BREAKFAST

INGREDIENTS	QUANTITY per ration	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Soja milk	100 cc	42	42	3.6	3.6
Ground Céréals (Wheat flakes	50g	342	171	10.7	5.3
Spirulina	5g	500	25	60	3
Total			225		12

➔ PREPARATION TIME

- Less than 1 minute preparation when using proposed ingredients
- + Time for soya milk and wheat flakes processing

➔ ENERGY

Direct consumption : negligible

Non direct consumption :

- Energy for wheat flakes production
- Energy for soya milk production
- Energy for spirulina drying

➔ SENSORIAL ACCEPTABILITY

Tests to be done

- Aspect, color, taste, texture to be appreciated (Soya milk taste and spirulina taste and color may be difficult to accept by unacquainted people)

➔ ALTERNATIVE TECHNOLOGY

- Possibility of using wet spirulina : energy swing for trying
- Extruded spirulina/flakes

III.2 JUICE

INGREDIENTS	QUANTITY per ration	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Tomato juice	100 cc	70	70	0.1	0.1
Celery salt					
Spirulina	5g	500	25	60	3
Total			95		3

➔ PREPARATION TIME

- Less than one minute
- Time for tomato juice production

III.2.1.1.1.1 ➔ ENERGY

Direct consumption : negligible

Non direct consumption :

- Energy for tomato juice production
- Energy for drying spirulina

➔ SENSORIAL ACCEPTABILITY

Tests to be done

- Aspect, color, taste, texture to be appreciated

➔ ALTERNATIVE TECHNOLOGY

- Possibility of using wet spirulina

III.3 SALAD

INGREDIENTS	QUANTITY per ration	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
1 Lettuce	300 g	15	45	1.2	3.6
Soya yogurth Tofu ?	100ml	123	123	12	12
1 Vinegar					
Spirulina	20g	500	100	60	12
Total 4 persons			270		27
Total			70		7 (3g from spirulina)

➔ **PREPARATION TIME**

- Few minutes
-

III.3.1.1.1.1 ➔ ENERGY

Direct consumption : negligible

Non direct consumption :

- Yogurth production and spirulina drying energie

➔ **SENSORIAL ACCEPTABILITY**

Tests to be done

- Aspect, color, taste, texture to be appreciated

➔ **ALTERNATIVE TECHNOLOGY**

- Granulated spirulina

III.4 BOILED CEREALS

INGREDIENTS	QUANTITY per ration (g)	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Boiled brown rice or wheat	150g	132	200	2.5	3.5
Onions	100g	34	34	1.3	1.3
Spices					
Spirulina	10g	500	50	60	6
Total			284		10.8

➔ **PREPARATION TIME (for two or four portions with the same pan)**

- About ten minutes
- Time for ingredients production

➔ **ENERGY**

Direct consumption : negligible

Non direct consumption

- Cooking of cereals: 50 Kcal/person

➔ **SENSORIAL ACCEPTABILITY**

Tests to be done

- Aspect, color, taste, texture

➔ **ALTERNATIVE TECHNOLOGY**

- Possibility of using wet spirulina

III.5 SOUP : CRE AM OF SPINACH

INGREDIENTS	QUANTITY per ration (g)	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Spinach	1000g	26	260	2.5	25
Ground brown rice	100g	357	357	7.3	7.3
1 Onion	100g	34	34	1.3	1.3
Water	0.5l				
Spirulina	20g	500	100	60	12
Total 4 persons			750		45
Total/ person			180		11 (3g from spirulina)

➔ **PREPARATION TIME**

- About ten minutes
- Cooking time

➔ **ENERGY**

Direct consumption : negligible

Non direct consumption

- Ground rice fabrication
- Cooking: 400 kcal/ person (100 kcal/ person)

➔ **SENSORIAL ACCEPTABILITY**

Tests to be done

- Aspect, color, taste, texture

➔ **ALTERNATIVE TECHNOLOGY**

- Possibility of using wet spirulina
- Or non concentrated wet spirulina

III.6 SPIRULINA NOODLES

INGREDIENTS	QUANTITY per ration (g)	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Whole flour	85g	341	290	11.5	9.7
Spirulina	15g	500	75	60	9
Water	85 ml				
Total			365		18.7

➔ **PREPARATION TIME**

- 20-30 min (mixing and cutting into strips)
- Drying: time ?
- Time for flour production

➔ **ENERGY**

Direct consumption : negligible
 Non direct consumption

- Cooking: 200 kcal/ person
- Spirulina and other ingredients making

➔ **SENSORIAL ACCEPTABILITY**

Tests to be done

- Aspect, color, taste, texture

➔ **ALTERNATIVE TECHNOLOGY**

- Wet spirulina

III.7 SPAGHETTI SAUCE

INGREDIENTS	QUANTITY per ration (g)	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Tomatoes	500g	18	90	0.9	4.5
Onions	200g	34	68	1.3	2.6
Spirulina	20g			60	12
Oil (soya ?)	1 dl	900	100	0	0
Salt, piment					
Total 4 peoples			258		19
1 person			60		4-5 (3g from spirulina)

➔PREPARATION TIME

- About ten minutes
- Cooking time

➔ ENERGY

Direct consumption : negligible

Non direct consumption

Cooking: 200 kcal/ 4 persons (50 kcal/ person)

➔SENSORIAL ACCEPTABILITY

Tests to be done

- Aspect, color, taste, texture

➔ ALTERNATIVE TECHNOLOGY

- Possibility on using wet spirulina

III.8 BREAD

25 LITTLE ROLLS

INGREDIENTS	QUANTITY per ration (g)	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Whole flour	250g	341	852	11.5	28
Oil	1 dl	900	90	0	0
Water	1.5 dl				
Spirulina	50g	500	250	60	30
Salt					
Total 25 rolls			11,2		58
2 rolls			95		4.6 (2.5 from spirulina)

➔ PREPARATION TIME

- 30-40 minutes of preparation (Kneading)
- Cooking time: 25 min
- Total about 45 minutes preparation time + time flour making

➔ ENERGY

Direct consumption : negligible
 Non direct consumption

- Kneading
- Cooking: 5 kWh (10 kWh x 0.5h)/ 25 rolls: 0.2 kWh per roll

➔ SENSORIAL ACCEPTABILITY

Tests to be done

- Aspect, color, taste, texture

➔ ALTERNATIVE TECHNOLOGY

- Possibility on using wet spirulina
- Granulated spirulina for inclusions

III.9 PETITS FOURS

30 PETITS FOURS

INGREDIENTS	QUANTITY per ration	Kcal/100g (Kcal)	(Kcal)	Proteins/100 (g)	Proteins (g)
Flour	200g	365	730	10	20
Spirulina	50g	500	250	60	30
Fat (soya oil)	100 ml	900	900	0	0
Sugar	100g	420	420	0	0
Water	1 dl		262		
Ground walnut	50g	525	287	10.6	5.3
Ground Almonds	50g	575		19	10
Total 30 petits fours			2850		65
5 petits fours			475		11 (5g from spirulina)

➔ PREPARATION TIME

- About 20 minutes
- Cooking time
- Time préparation for other ingrédients

➔ ENERGY

Direct consumption : negligible

Non direct consumption

- Grinding of dried fruit
- Cooking: 3 kWh/ « 30 petits fours »: 0.1 kWh / petit four

➔ SENSORIAL ACCEPTABILITY

Tests to be done

- Aspect, color, taste, texture

➔ ALTERNATIVE TECHNOLOGY

In the opposite page, the table sums up the main results of this evaluation .

	NUTRITION		PREPARATION TIME		ENERGY		ORGANOLEPTIC
	Kcal	Proteins (g)	Direct	Non Direct	Direct	Non Direct	
Breakfast	225	12	<1 min	III.10 Soya milk Wheat flakes	£	Spirulina drying Soja milk and flakes production	(not evaluated)
Tomato juice	95	3	<1 min	Tomato juice production	£	Spirulina drying Tomato juice	
Salad	70	7	Few minuts	Soya yogurth	£	Spirulina drying Yogurth	
Boiled cereals	284	11	10 Min. /4	(rice and onion agric. Prod)	0,058 kWh	Spirulina drying Rice preparation	
Soup	180	11	10 min. /4	(spinach, onion, rice, agric prod.)	0,116 kWh	Spirulina drying Grinding rice	
Spirulina noodles	365	19	25 min/ 10	Flour production	0,232 kWh	Spirulina drying Flour production	Commercial products are easily acceptable (but green coloured)
Spaghetti sauce	60	5	10 min. /4	Soya oil (Tomato onion ag prod)	0,058 kWh	Spirulina drying	
Bread (2 rolls)	95	4.6	45min /10	Flour production	0,4 kWh	Spirulina drying Flour production	
Petits fours (6)	475	11	20 min/6	Flour production	0.5 kWh	Spirulina drying Flour, Soya oil, Dried fruits grinding	

FIRST CHARACTERISATION OF THE RECIPES

This table stresses some very simple first conclusions:

- It appears possible to have a normal daily **diet** including some proteins with various combinations of different dishes of the different types proposed in the table.
- The **time** which is necessary for meal preparation is, first of all, linked to the number of portions which are prepared at the same time = this will depend upon the organization in the base. If necessary, it could be possible for example to prepare 10 portions at the same time and therefore to reduce the time preparation of each portion to some minutes.
- The time necessary for preparation of ingredients has not been evaluated : it could be much longer than the “direct” time for meal preparation, moreover the time preparation will depend upon the quantity which is made in one time.
- The **energy** directly used to produce the meals is limited.
- The energy corresponding to ingredients preparation may be much higher:
 - Spirulina drying
 - Cereal or rice preparation
 - Flour production
 - Soya oil or soya milk preparation

are among the most frequent ingredient production operations that must be evaluated. To have an integrated evaluation of the energy consumption (it would be the same for time preparation)

- **Organoleptic acceptability** : we have not realized any professional testing of the products. It must be reminded that Spirulina gives a dark green colour to all the foods and it has a specific taste which are rejected by many people. The goal of 20g/ day long term spirulina ingestion will need specific efforts.

IV DAILY DIETS

To determine the quantity of spirulina that the astronauts can plan to consume per day, we propose some combinations of different dishes containing spirulina.

It has been done by varying at the same time the type of recipes and the occasions of consumption, not to introduce too much lassitude in the astronauts' feeling, while trying to achieve the 14 g / day goal for proteins from spirulina.

We can see that to achieve this goal, the astronauts should consume food containing spirulina from 2 to 4 times per day, every day.

We do not know if such a consumption will be accepted, and especially, it will be necessary to analyse two specific points in the following works.

- long-term acceptability
- possible effects on the total feed ration

**PROPOSED DAILY DIETS AND
DAILY PROTEIN CONTRIBUTION OF SPIRULINA**

Menus 1	Proteins provided by spirulina
Tomato juice + spirulina	3 – 5 g
Dairy product (soya) + cereals + spirulina	3g
Lettuce + spirulina	3g
4 little rolls	5g
total	14-16g

Menus 2	Proteins provided by spirulina
Tomato juice + spirulina	3 – 5 g
Cooked cereals + spirulina	6g
Soup	3g
4 little rolls	5g
total	17-20g

**PROPOSED DAILY DIETS AND
DAILY PROTEIN CONTRIBUTION OF SPIRULINA**

Menus 3	Proteins provided by spirulina
Juice or Dairy product + cereales + spirulina	3 – 5 g
Spaghettis + spirulina sauce	3g
Lettuce + spirulina	3g
4 little rolls	5g
total	14-16g

Menus 4	Proteins provided by spirulina
Tomato juice or Dairy product (soya)+ cereales + spirulina	3 – 5 g
Noodles with spirulina	9g
5 petits fours	5g
total	22 g

V ALTERNATIVE TECHNOLOGIES CONCERNING SPIRULINA PRODUCTION

As we saw in the above pages, some technological topics have been mentioned:

- the possibility of using wet spirulina (not dried).
- the possibility of using the spirulina in granulated form to vary the presentations and partly avoid the colouring effect of Spirulina powder.

In addition, with the example of the texturization of the soya proteins, it appears interesting to explore the possible use of extrusion in the Spirulina processing.

Finally, if the colour of the spirulina is a psychological limitation of consumption, we think that it could also be worth to explore the way of discoloration.

V.1 Fresh Biomass

Some recipes, in particular the soups, the sauces, perhaps even the bread, which need water in the formulation, could be carried out starting from spirulina not dried, i.e. from fresh biomass.

Jean-Paul Jourdan (Manuel de culture artisanale de la spirulina (9)) explains that the fresh biomass (approximately 25 % of dry content) of good quality, can be directly consumed after pressing: he also thinks that may be the organoleptic acceptability of fresh spirulina may be much higher than that of dried spirulina.

- fresh, it can be kept out of container closed up to 8 days at 1° C, 2à 3 days at 5°c, 1 day at 8°C.
- Preserved: it is possible to salt to 10% the biomass that has just been pressed: one obtains by homogenising a rather fluid paste. It can be kept at ambient temperature of 20 °C during several months (tests, have been done for 4 months with a rather correct bacteriological quality).

One can thus add the spirulina to a soup or a sauce at the end of the cooking time. It also possible to have pasteurization of spirulina in ebullient water, and stop cooking as soon as " that goes up " (like milk). It should be noted that the phycocyanine (blue pigment) is destroyed above 70°C in the presence of water.

The spirulina prepared in this way, at least for some preparations, makes it possible to avoid an operation of drying and to save energy.

V.2 Granulated spirulina

We can have 2 target with this product:

- to vary the presentation
- and to use the spirulina without having a colour impregnation of all the preparation.

For example, we tried small inclusions of spirulina in white bread which will be perhaps easier to accept by the consumer than entirely coloured bread.

V.3 Discoloration of spirulina

We saw that the blue pigment (phycocyanine) could be destroyed by a thermal hot water treatment. In the literature, other processing ways are evoked (alcohol for example).

Different works could be carried out:

- on the possible processing
- on the impact in the acceptability of the preparations
- At last, on the nutritional effects of the spirulina

V.4 Extrusion

Dmitriy V. Z SYPKIN and al (1) describe the advantages of extrusion:

- possibility of producing a wide range of foods from a limited number of raw materials
- low sensitivity to gravity except during the introduction of raw material in powder
- low water activity of products made at high temperature and possibility of storing them for a few months

They give a list of main products that can be produced by extrusion: in particular chips, snacks... and textured proteins.

It seems that snack bars and chips with spirulina already exist (United States or certain countries of Asia), but we did not obtain information on the companies which produce them. We do not know either if extrusion is the process used, but that seems possible.

This wtechnology would be interesting to explore.

In addition, many works have been realised on texturized vegetal proteins with an aim of obtaining " green steaks ". Many products for vegetarians already exist (soya steaks)

It would be very interesting to see whether the spirulina could be textured, alone, or in association with others ingredients, in particular soya or wheat.

Let us underline finally that extrusion at high temperature makes it possible to obtain for example, corn and flakes, pre-cooked rice or boulgur, which are some of the ingredients (associated with spirulina) in the described recipes.

Extrusion will then allow to create new products and recipes.

VI Conclusion

- We can observe that it is much more difficult to consume spirulina when the associated ingredients are limited .

The acceptability will probably be poor (at least from some products)and it will not be very easy to consume 20 g/day with good long term organoleptic acceptability.

- The consumption of spirulina is strongly associated with that of wheat flour, corn soya, in the processed products. The processing of these products in the base will have to provide a great number of semi-finished products. This, will make it possible to diversify the recipes containing spirulina.
- As for evaluation, it is difficult to dissociate the spirulina from the others ingredients. The recipe, as a whole, must be evaluated, by integrating all the ingredients which can be more time-consuming or energy-consuming than processing of the recipe itself.
- In the following works which will be undertaken, it will be necessary to optimise some traditional recipes containing spirulina, with a limited list of ingredients and to test the acceptability according to the contents of spirulina finished the product.

At this stage of the work, the working program to implement should be:

- First, to develop a very limited list of recipes (for example, one not cooked, one cooked and salted, one cooked cake or pastry) : these recipes would be optimized in terms of acceptability.

-Second, it will be necessary to test the impact of spirulina processing = different ways of concentrating and drying, possible use of fresh spirulina. Impact on time preparation, necessary energy, organoleptic acceptability.

-Third: a complete evaluation of the energy necessary to process the spirulina and the different ingredients will allow to optimize the recipes.

- Fourth, extension of the list of the recipes on the basis of these first conclusions and appreciation of the daily diets.

In the frame of the AURORA program ,a food preparation program was proposed, starting from the consumer point of view, and targeting an optimization of the whole food production system. To start with the analysis of such a complex system, the proposed program will : - focus on a short list of about 8 food crops which production has been studied in the Melissa program, develop a limited list of recipes of different meals using mainly these food items,- analyze labor and equipment cost for each ingredient and recipe, taking into account mass,time, power and space constraints,

- optimize the food processes and equipment to be used to produce food semi-products and composed meals, probably leading to some final meals slightly different from the standard earth preparation,
- rate the acceptability of the menu items by panels, as well as test the acceptability of products associations close to a global space diet,

- - integrate nutrient, cost and acceptability data for individual recipes into an optimization model, which will help to select low-cost diets, to extend the future list of recipes and to estimate the total need for each individual crop.

References

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jpp@bsi.fr
- 10 **Repertoire général des aliments :** INRA, Lavoisier édition
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ANNEXES

EXAMPLES OF COMPLETE RECIPE

Peach velvety (drink)

Ingredients

2 quite ripe bananas
2 peach
1 glass of Soya milk
1 glass of apple juice
2 tea spoon of spirulina

Preparation

Mix the whole in the mixer
For a more fluid drink, add Soya milk

Spinach dipping sauce (Appetisers)

Ingredients

200g lb. feta cheese
1 cup plain yoghurt
3 cups minced spinach leaves
¼ cup chopped black olives
30g minced green onion
4g spirulina
Salt and cayenne

Preparation

Force the feta cheese through a fine sieve in a bowl, mix it the yoghurt and combine the mixture well.
Stir in the rest of the ingredients, adding salt to taste.
Transfer the sauce to the serving bowl and chill for at least 1 hour
Serve the sauce with toasted pita or raw vegetables.

Spinach velvety (soup)

Ingredients

1kg of fresh spinach
100g of complete and crushed rice
1 clove of garlic
Thyme
½ litre of water

Salt
Spirulina

Preparation

Cook the onion, the garlic and the thyme in ½ litre of salted water during 10 minutes

Take out of fire and mash the whole in a puree press

Add the flour, the spinach and mix the preparation

Reheat with very soft fire during one minute

Alternative: Cress, nettle and sorrel.

Zucchini purée

Ingredients

5 cups of zucchinis in cubes.

1.5 cup of onions in cubes

3 gloves of garlic.

3 tea spoons of olive oil

Salt

1 Tea spoon of spirulina powder

Parsley

Cayenne pepper

Preparation

In the oil, fry the garlic, the onion, zucchini and then, the parsley.

Cook 10 minutes

Mix the whole in the mixer

Add the cayenne pepper.

Spirulina noodles

Ingredients

85g of flour meal

15g of spirulina

85 ml of water

Preparation

Mix the whole roll, cut in thin straps.

Dry and cook 5-10 minutes in salted water.

Marbled cakes with spirulina

Ingredients

200g biological flour
200g cane sugar
5 eggs
½ of oils sesame glass
Lemon peel
Lemon juice
30-50g of spirulina
50g of minced almonds

Preparation

To separate yellow and white from eggs

In the bowl mix the yellows from the eggs with the lemon juice and the sugar. Then add the oil and 150 g of flour.

Separate in two parts: mix gently 50g of spirulina with the first part and mix 50g of flour with the second part.

Whisk the eggs white, separate in two and include them in each part.

Pour the two dough in alternation in a cake tin papered with sulphured paper.

Powder the cake with almonds and put in the oven.

(180°, during one hour).

Little rolls with sunflowers seeds

Ingredients

250g of complete flour
0.1 litre of olive oil
0.15 litre of water
50g of sunflowers seeds
50g of spirulina
2g of salt

Preparation

Mix the flour, the spirulina, the sunflowers seeds and the salt.

Pour the oil and the water

Knead the whole with the hands

Let rest

Separate the dough in 25 balls.

Cook during 25 minutes

Spicy kebabs

Ingredients

250 ground beef or lamb
1 cup minced onions
6g salt

1g ginger
10g spirulina
2g turmeric
2g pepper
1 cup yoghurt
¼ cup flour
40g butter

Preparation

Mix together the meat, onions, salt, spices, spirulina and ½ cup of yoghurt.
Roll into sausage shapes 1 inch in diameter and 4 inches in length.
Dip in the remaining yoghurt and then the flour.
Melt the butter in a skillet.
Cook the kebabs over low heat until browned on all sides.

Salmon mousse

Ingredients

1 pkg unflavoured gelatine
¼ cup cold water
½ cup boiling water
½ mayonnaise
10 g lemon juice
10 g grated onion
2 g tabasco sauce
2 g salt
6 g spirulina
1 can red salmon
½ cup heavy cream, whipped
cucumber swirls
Tomato aspic flowers

Preparation

In a large bowl sprinkle gelatine over cold water soften.
Add boiling water and stir until dissolved. Let cool about 5 minutes.
Add mayonnaise, lemon juice, onion, tabasco sauce, salt and spirulina. Mix well until thoroughly blended.
Chill until the consistency of egg white is reached.
Drain salmon in blender and fold into gelatine mixture.
Gently fold whipped cream into salmon mixture.
Turn into a 4 cup decorative mould and refrigerate until firm, about 4 hours or overnight.
Remove from mould and garnish with cucumber and tomato.

Spaghetti sauce

Ingredients

2 chopped onions

3 chopped tomatoes

2 cloves of garlic

8g spirulina

Salt, red pepper, olive oil

Preparation

Turn russet onions in the oil .

Them, add the remainder, except the spirulina which is added to the last minute.