



DESCRIPTION OPTIMAL COMPOSITION OF DIFFERENT PUMPKIN FRUIT PULP FORMULATIONS

DELIVERABLE 4.7

PulpIng

Developing of Pumpkin Pulp Formulation using a Sustainable Integrated Strategy



montanhas
de investigação



UNIVERSITY OF
THESSALY





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Document information

Deliverable Number	4.7
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Responsible partner	DECORGEL
Reviewers	All partners
Version	1

Version	Date	Author	Description of change

1 Summary

The PulpIng project aims to develop a high-quality pumpkin pulp product enriched with value-added compounds from pumpkin by-products. This initiative promotes sustainability and an integrative approach. The main objective of WP4 is to develop a pumpkin pulp formulation ready to use and incorporated with natural preservatives that ensure stability over the product shelf-life. The present report concerns WP4 deliverable D4.7 “Description optimal composition of different pumpkin fruit pulp formulations”, where is described the composition of the pulp formulations achieved in Task 4.2.

2 Different formulations

Different formulations based on pumpkin pulp were tested in the present Task 4.2. A final formulation was obtained by replacing 50% of the potassium sorbate with pumpkin peel extract. For comparison purposes, and in compliance with a contingency plan, a formulation was also obtained with the total replacement of potassium sorbate by pumpkin seed extract. These formulations compositions are described below.

3 Description of the formulations

3.1 Manufacturing process

The formulation was prepared using 91% mashed pumpkin pulp, and the additional components included corn starch, beta-carotene colorant, citric acid, sodium citrate, and preservative. As the preservative, the extract obtained from the Butternut squash peels under the optimal global condition by heat-assisted extraction, as described in Deliverable 2.4, was incorporated into the formulation at a concentration of 10g/kg, replacing 50% of the potassium sorbate content of the formulation traditional. In a second formulation, potassium sorbate was completely replaced by pumpkin seed extract (at 10g/10kg), obtained as described in Deliverable 2.3.

The ingredients were carefully mixed using a mixer and then thermally processed in a double-jacketed heating tank with an agitation paddle. The mixture was heated to 90 ± 2 °C, held for 3 minutes, and then packaged at >76 °C in sterile airtight container. Each batch was stored under refrigeration at 5 ± 2 °C.

3.2 Critical conditions

According to a detailed evaluation of the shelf life of the formulations, described in Deliverable 4.3, the proposed shelf life for the formulation preserved with peel extract is 21 days, considering colour maintenance, and its consumption is safe for up to 45 days.

For the formulation with seed extract, an extended shelf life of 45 days is expected. This formulation fulfils a contingency plan to achieve a complete shelf life of at least 30 days (current shelf life of the standard formulation) and complete replacement of potassium sorbate.

3.3 Final formulation

Formulation of preserved pumpkin pulp with pumpkin peel extract at a concentration of 10g/kg and 50% of the potassium sorbate content of the traditional formulation, after 1 day of manufacturing, is presented in **Figure 1**.



Figure 1. Appearance of the final formulation

3.3.1 Composition of the final formulation

- Pumpkin pulp (2706.8 g) + mix of ingredients (natural β -carotene, starch, citric acid, citrate and 50% of potassium sorbate; 263.2 g) + peel ingredient (30.0 g).

4 Final formulation technical sheet

The technical data sheet of the developed formulation follows the standards and parameters of the traditional product described in **Figure 2**, except for the list of ingredients where the natural pumpkin peel ingredient developed is added.

Technical data sheet - Prototype PUMPKIN FRUIT PULP

<p>Description:</p> <p>Pumpkin preparation</p>	<p>Type and packaging materials used:</p> <p>Membrane film with barrier protection Bucket of polypropylene Appropriated polypropylene cap.</p>																																																										
<p>Ingredients:</p> <p>Pumpkin (91%), modified maize starch, acidity regulators (citric acid, sodium citrate), preservative, colour (natural beta-carotene).</p>	<p>Package:</p> <p>Net weight 5,50 kg 30 Days</p>																																																										
<p>Labeling:</p> <p>Producer/distributor name and address; Commercial designation; Ingredients ; Allergens ; Expiration ("Best before end..."); Conservation; Method of use; Lot number; Product reference; Net weight.</p>	<p>Expiration date:</p> <p>30 Days</p> <p>Allergens:</p> <ul style="list-style-type: none"> Celery and products thereof - Cereals containing gluten - Crustaceans and products thereof - Eggs and products thereof - Fish and products thereof - Lupin and products thereof - Milk and products thereof (including lactose) - Molluscs and products thereof - Mustard and products thereof - Nuts and products thereof - Peanuts and products thereof - Sesame seeds and products thereof - Soybeans and products thereof - Sulphur dioxide and sulphites - <p>(+) Yes (-) No</p> <p>Decorgel has implemented procedures to maintain the maximum safety of the products, however, it is not possible to exclude the risks of contamination inside the premises. In the facilities there are the following allergens: Gluten, Soy, Eggs, Milk including Lactose, Nuts and Sulphur Dioxide and Sulfitos.</p>																																																										
<p>Characteristics</p> <p>Organoleptics</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Colour</td> <td style="width: 25%;">Orange</td> <td style="width: 25%;">Texture</td> <td style="width: 25%;">Compact</td> </tr> <tr> <td>Flavour</td> <td>Pumpkin</td> <td></td> <td></td> </tr> </table> <p>Physical-Chemical</p> <p>Brix min: 10 max: 16 pH min: 4,3 max: 4,7 Exogenous Foreign bodies Should tend to zero Endogenous Foreign bodies <10um/10kg</p> <p>Microbiological Criteria (Limits)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Microorganisms a 30 °C</td> <td>< 10³</td> <td>Ufc/g</td> <td></td> </tr> <tr> <td>Coliforms a 30 °C</td> <td>< 10²</td> <td>Ufc/g</td> <td></td> </tr> <tr> <td>Yeast and Moulds</td> <td>< 5x10²</td> <td>Ufc/g</td> <td></td> </tr> <tr> <td>E. Coli</td> <td>< 10</td> <td>Ufc/g</td> <td></td> </tr> <tr> <td>Listeria Monocytogenes</td> <td>< 100</td> <td>Ufc/g</td> <td>Reg (CE) n.º 2073/2005</td> </tr> <tr> <td>Salmonella</td> <td colspan="3">Not detected in 25g</td> </tr> </table> <p>GMO S and irradiation</p> <p>This product does not contain ingredients that require additional specific labeling under Regulation (CE) No. 1829/2003 and Regulation (CE) No. 1831/2003 and its amendments. The product does not make use of irradiation in its production process according to directives 1999/2/EC and 1999/3/EC and their amendments.</p> <p>Conservation:</p> <p>Keep in a cool and dry place, since protected from direct sunlight. Once opened, store in a cool temperature.</p> <p>Instructions for use:</p> <p>This product can be used directly or diluted into cream, ice-cream, milk or pastry products in order to obtain flavoured compounds. Apply enough quantity for the wanted final effect.</p> <p>This product can be consumed by the general public, except allergic people, to any marked substance with (+) on the allergens table in this document.</p>	Colour	Orange	Texture	Compact	Flavour	Pumpkin			Microorganisms a 30 °C	< 10 ³	Ufc/g		Coliforms a 30 °C	< 10 ²	Ufc/g		Yeast and Moulds	< 5x10 ²	Ufc/g		E. Coli	< 10	Ufc/g		Listeria Monocytogenes	< 100	Ufc/g	Reg (CE) n.º 2073/2005	Salmonella	Not detected in 25g			<p>Nutrition Information (per 100 g)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Energy</th> <th style="text-align: right;">236 kJ / 56 kcal</th> </tr> </thead> <tbody> <tr> <td>Fat</td> <td style="text-align: right;">0,13 g</td> </tr> <tr> <td>of which saturates</td> <td style="text-align: right;">0,00 g</td> </tr> <tr> <td>Carbohydrate</td> <td style="text-align: right;">12 g</td> </tr> <tr> <td>of which sugars</td> <td style="text-align: right;">4,2 g</td> </tr> <tr> <td>Protein</td> <td style="text-align: right;">1,0 g</td> </tr> <tr> <td>Salt</td> <td style="text-align: right;">0,00 g</td> </tr> </tbody> </table> <p>Calculation based on product formulation and the information provided by the supplier of materials. Due to the nature of these products, the nutritional composition may vary, consequently, these data represent typical average values only.</p> <p>Packaging requirements</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Standard palletization</th> <th style="text-align: left;">Primary packaging (PP)</th> </tr> </thead> <tbody> <tr> <td>Dimension (LxWxH) 1200*1000*1100 mm</td> <td>Dimension (LxWxH) 227*227*180 mm</td> </tr> <tr> <td>Net weight 688 kg</td> <td></td> </tr> <tr> <td>Estimated gross weight 732 kg</td> <td></td> </tr> <tr> <td>Units base 25</td> <td></td> </tr> <tr> <td>Units height 5</td> <td></td> </tr> </tbody> </table> <p>Transport can be done at room temperature, since protected from direct sunlight</p> <p>Observations:</p> <p>This document is representative of the prototype developed, therefore, final values are dependent of industrial studies. For industrial use and HORECA channel. Due to the natural characteristics of the raw materials, this product may undergo color changes over time. According to the natural characteristics of the raw materials, there may be slight differences between batches. Industrial adjustments can be made to ensure the product specifications.</p>	Energy	236 kJ / 56 kcal	Fat	0,13 g	of which saturates	0,00 g	Carbohydrate	12 g	of which sugars	4,2 g	Protein	1,0 g	Salt	0,00 g	Standard palletization	Primary packaging (PP)	Dimension (LxWxH) 1200*1000*1100 mm	Dimension (LxWxH) 227*227*180 mm	Net weight 688 kg		Estimated gross weight 732 kg		Units base 25		Units height 5	
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Figure 2. Technical data sheet