



LOCALNUTLEG project is part of the PRIMA programme supported by the European Union's Horizon 2020 research and innovation programme

MICROBIOLOGICAL AND ENZYMATIC DESCRIPTION OF THE FRUIT FORMULATIONS AGAINST NON-ADDED CONTROL SAMPLES ON THE SHELF-LIFE PERIOD

DELIVERABLE 4.2

Pulping

Developing of **Pumpkin Pulp** Formulation using a Sustainable **Integrated** Strategy



montanhas
de investigação



Decorgel



UNIVERSITY OF
THESSALY





Index

Document Information	3
1. Executive Summary	4
1.1. PulpIng in context	4
2. Microbiological and enzymatic description of the fruit formulations	5
2.1. Goal and Scope	5
3. Fruit formulation datasheet	5

Document Information

Deliverable Number	4.2
Deliverable name	Microbiological and enzymatic description of the fruit formulations against non-added control samples on the shelf-life period
Contributing WP	WP2: Pumpkin fruit pulp formulation
Contractual delivery date	M18, February 2022
Actual delivery date	M26, October 2022
Requested delivery date	May 2024
Dissemination level	Public
Responsible partner	IPB
Reviewers	All partners
Version	1

1. Executive Summary

PulpIng project aims at the development of a differentiated and added-value pumpkin fruit pulp with natural food preservatives rather than synthetic counterparts and, at the same time, create a product to prioritize low environmental impact. This report constitutes the deliverable D4.2 – “Microbiological and enzymatic description of the fruit formulations against non-added control samples on the shelf-life period”. Eco-friendly and easy-to-perform methodologies based on innovative technologies such as microwave and ultrasound will be applied in the extraction of bioactive compounds. Once the procedures are defined at the laboratory scale it is important to study and identify the strategies that allow to implement its scale up. This report then focuses on the study and analysis of the scaling up processes to be applied in the PulpIng project.

1.1. PulpIng in context

PulpIng is an innovation action which brings together 9 partners from 6 countries:



PulpIng aims at the stimulation of a value chain with innovative processes that goes throughout all developing stages of pumpkin fruit pulp formulation functionalized with a natural-based preservative extracted from pumpkin by-products. For this purpose, the project consortium is driven by the interest of all R&D, SME and industry partners, towards the generation a food value-chain based on developing a novel pumpkin fruit pulp product, incorporating pumpkin by-product extracts with preserving capacity, thus promoting the sustainable development of these ecosystems.

In fact, the aim is to improve the pumpkin production in northern Africa through technology transfer from research into established local enterprises. In line with sustainable development and

the “idea to application” strategy, pumpkin production will be improved by establishing the best agronomic conditions, extraction of preserving compounds from pumpkin by-products, use of these compounds to preserve fruit pulps, and finally studying their properties along shelf-life and enhanced shelf-life.

The objective of the PulpIng project is to stimulate a value chain with innovative processes that goes throughout all developing stages of pumpkin fruit pulp formulation functionalised with a natural-based preservative extracted from pumpkin by-products. Given the concept of the project, whereby each partner will generate its own data, from the establishment of agronomic conditions for pumpkin production (WP1) to life-cycle assessment of pumpkin (WP6), structured databases will be built and shared by all partners to optimise exploitation. So, PulpIng will produce high quality integrated datasets in the areas of: biology, agronomy, phytochemistry, food technology, chemistry, food and processing engineering, including access to scientific papers and studies based on pumpkin-based products, development of new food preservatives, ground-breaking foodstuff, sustainable processes and innovating knowledge exchange. For this reason, a default PulpIng data management approach is described in this document, which applies to all datasets that the project will generate. However, deviations from the default approach will be needed for some datasets, due to reasons such as confidentiality of data or embargo periods related to IPR or scientific publication.

2. Microbiological and enzymatic description of the fruit formulations

2.1. Goal and Scope

The goal of the present study consists of conducting a conclusive microbiological and enzymatic evaluation of the fruit formulation produced by partner Decorgel. The intended audience of this work thus constitutes the local pumpkin producers; scientific community; food and other industrial sectors; relevant market stakeholders, including consumers, regulatory agencies, rural development agencies; media; and general public.

3. Fruit formulation datasheet

The pumpkin preparation produced at Decorgel for commercial purposes is properly characterized through a product datasheet.

Thus, it is constituted of:

- pumpkin (91%);
- modified corn starch;
- acidity regulators (citric acid, sodium citrate);

- conservative (potassium sorbate);
- dye (natural beta carotene).

The pumpkin preparation is also characterized for:

- Organoleptic properties
 - Color: orange
 - Flavor: pumpkin
 - Texture: compact
- Physical chemical properties
 - Brix: between 10 and 16
 - pH: between 4.3 and 4.7
 - Exogenous foreign bodies: should tend to zero
 - Endogenous foreign bodies: < 10un/ 10kg

- Nutritional properties

Nutritional value (per 100g)	
Energy	244 kJ / 58 kcal
Lipids	0.17 g
of which saturated	0.00 g
Carbohydrates	12 g
of which sugars	4.3 g
Proteins	1.1 g
Salt	0.00 g

Note: Calculation based on the product formula and information provided by the suppliers of the raw material. Due to the nature of this product, the nutritional composition may vary and therefore these data represent typical mean values only.

- Microbiological properties

	Units (Ufc/g)
Microorganisms (at 30°C)	< 10 ³
Coliforms (at 30°C)	< 10 ²
Molds and yeasts	< 5x10 ²
<i>E. coli</i> b-glucuronidase positive	< 10 ¹
<i>Listeria monocytogenes</i>	Absent in 25g

Note: Following the Reg. (CE) n.° 2073/2005.

➤ Validity

Product validity is normally defined through a predictive logic, which is required to be able to estimate the validity in long life products, taking into account the physical chemical properties of the product, its fabrication process and the historical of other products already existing. So, in terms of food safety it is validated that this commercial pumpkin preparation is framed within process and physical chemical parameters (for pasteurized products, with conservative, pH between 4.3 and 4.7 and Brix < 20), thus presenting a minimal microbiological validity of 6 months. However, the defined validity has in consideration the quality of the product as well as the microbial growth, or in other words, the loss of its organoleptic properties. For such reason, normally the validity that resides in the technical sheet of the commercial product is only of 30 days in order to preserve the sensorial characteristics of the product and also because this product does not require commercially a bigger validity.

The microbiological and enzymatic profiles of the commercial fruit formulation have been determined by IPB.

Microbiological data:

The pumpkin preparation produced at Decorgel for commercial purposes was analyzed in terms of microbial load. Therefore, the detection and counting of aerobic mesophilic microorganisms, Coliforms, *E. coli*, Yeasts and moulds was carried out at CIMO-IPB, following the International Organization for Standardization procedures (ISO).

According to the obtained results, none of the microorganisms was detected in the commercial pumpkin formulation commercialized by Decorgel.

Enzymatic data

Not applied to this product. The industry does not apply this assay to this type of product, evaluating the shelf life only with the physical-chemical evaluation.