Effect of Pulse Flours on the Physiochemical Characteristics and Sensory Acceptance of Baked Crackers.

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Application of Molecular Gastronomy principles in the design of pulse based functional foods

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Sinéad McCarthy
Catherine Barry-Ryan
Overview

- Ingredients - *why pulses?*
- Molecular Gastronomy principles
- Current study
- Observations
  - Sensory attributes
  - Nutritional value
- Further work
Why pulses?

**Sustainable**
- Robust
- Nitrogen fixing
- Cost efficient

**Nutritional**
- High protein
- High fibre
- Phytonutrients
- Low fat
- Low sugar

**Challenges**
- Flavour
- Protein & Fibre
- Physiochemical properties
Holistic food design

Ingredients & Processing

Molecular Gastronomy Principles

Sensory experience

Nutritional value
Methodology

Formulation & Processing
- Bake trials
  - 40% flour
  - 21m & 31m
  - Prepared in triplicate

Physical & Chemical Analysis
- Dough TPA
- Colour & texture properties
- Protein & fibre
- Antioxidant activity

Sensory Analysis
- 9-point hedonics
- Appearance, colour & texture
- Anova ($p<0.05$)
Appearance & Colour

Control 31m

FB 21m
YP 21m
GP 21m

FB 31m
YP 31m
GP 31m

Overall Appearance
Colour

P < 0.05
Colour: Instrumental vs Sensory

**Control**

- **FB 21m**
- **FB 31m**
- **YP 21m**
- **YP 31m**
- **GP 21m**
- **GP 31m**

**a* value**

**b* value**

**Colour acceptance**

**P < 0.05**

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**L* value**

**Colour acceptance**

**P < 0.05**
Hardness & Mouthfeel

**Hardness (N)**
- Control
- FB 21m
- FB 31m
- YP 21m
- YP 31m
- GP 21m
- GP 31m

**Hardness: Consumer acceptance**
- C 31m
- FB 21m
- FB 31m
- YP 21m
- YP 31m
- GP 21m
- GP 31m

**P < 0.05**
Nutritional value

Protein %

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Fibre %

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Antioxidant activity

TPC mg GAE/100G

Flour type & bake time

Control FB 21m FB 31m YP 21m YP 31m GP 21m GP 31m

DPPH mg AAE/100g

Flour type & bake time

Control FB 21m FB 31m YP 21m YP 31m GP 21m GP 31m

P < 0.05

P < 0.05
Consumer value

Overall Appearance
Colour
Hardness
Mouthfeel

C 31m
FB 21m
FB 31m
GP 21m
GP 31m
YP 21m
YP 31m

Control 31m
YP 31m
FB 31m

P < 0.05
Future work in this area

• Optimisation of baking conditions
  • Nutritional and sensory
• Continued application of MG principles
  • Flavour profiling during processing
  • Flavour optimisation: the sensory experiences
• Further application of pulse flours
Acknowledgements

Teagasc Irish Food Research Centre
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How will you celebrate?