

Dietary carrot powder

Team: *“More than just a carrot”*

Agenda

- Description of the idea
- Technical aspects
 - Bio-based materials
 - Process diagram (mass balances)
- Environmental impact
 - Input, output, residual streams
 - Life cycle
- Economical viability
 - Market potential
 - Cost analysis
 - SWOT analysis
- Final remarks

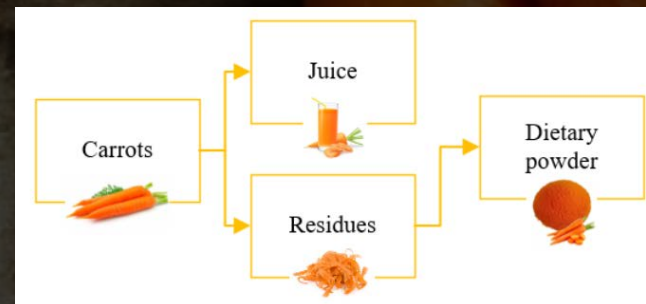
The innovative idea

For juice production:

- Significant waste during juicing
- 1/3 of carrot is waste/residues
 - Pulp and peel

The idea – Innovative aspects:

- Make a dietary carrot powder from residues
 - Dietary fibers
 - Carotonoids
 - Flavonoids
- Use the entire carrot!



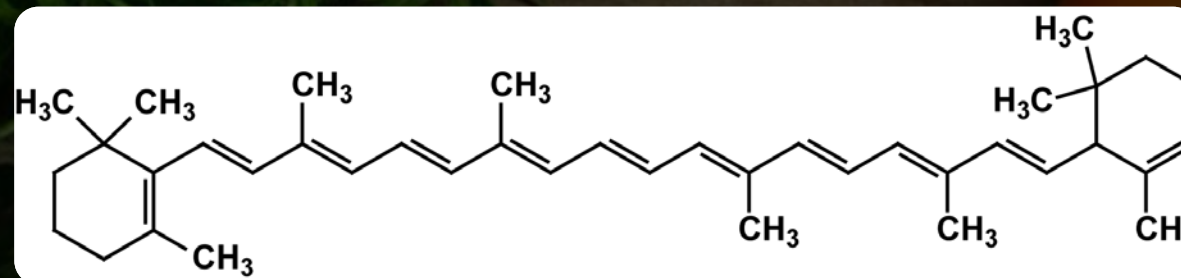
Bio-based materials

Raw material

- Water percent – 58 [%]
- Dietary fibers – 2.3-3.3 [g/100 g]
- Carotenoids – 4 [mg/100 g]
- Flavonoids – 4 [mg/100 g]

Product (Expected):

- Water percent – 8.4 [%]
- Dietary fibers – 15-16 [g/100 g]
- Carotenoids – 6.5-10 [mg/100 g]
- Flavonoids – 6.5-10 [mg/100 g]

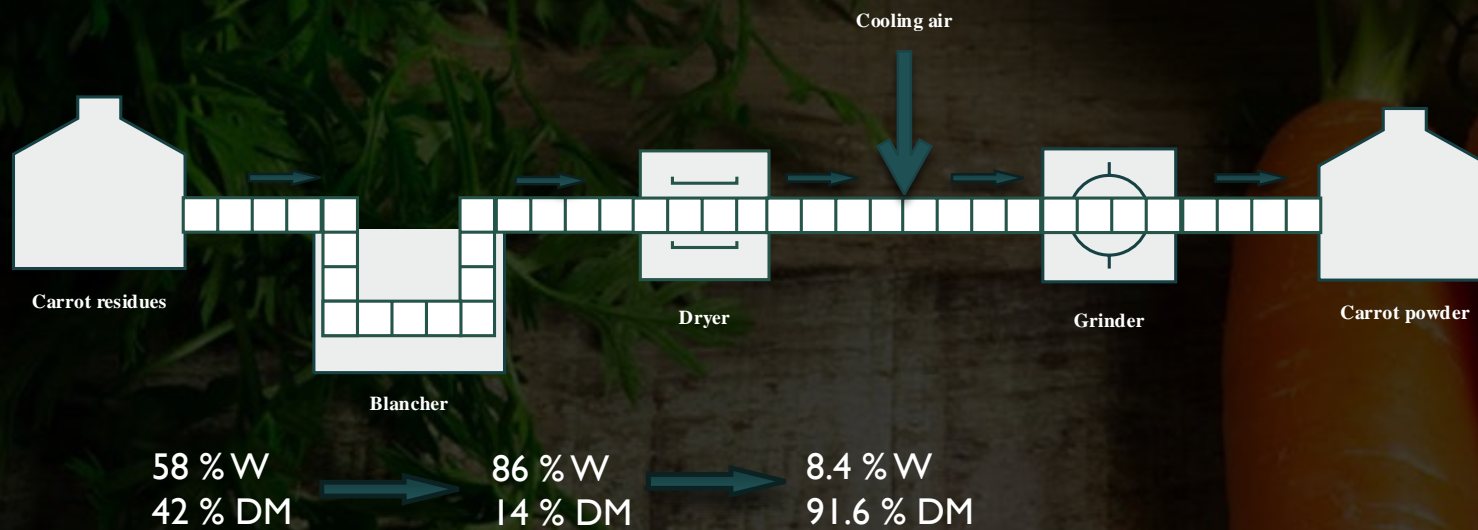


β-carotene



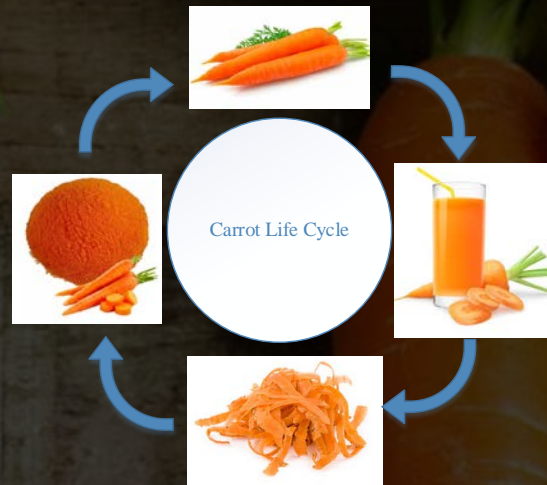
Process diagram

- Blancher – 90 [°C] in 1 minute
- Dryer – 60 to 80 [°C]
- Grinding to 125-425 [µm] in powder size



Environmental affect

- Streams
 - Input – Raw material and water
 - Output – Carrot powder
 - Residual streams – Water and loss during production
- Resources
 - Water recycling
 - Carrot life cycle
- Biodegradable product
 - No additives



Market potential

- Applications
 - Baking
 - Nutrient supplement
- Benefits
 - Dietary fibers
 - Antioxidant effects
- *“The powder dietary supplements market is on track to grow from just under US\$ 25 billion in 2017 to more than US\$ 36 billion in 2022” (Fact.MR, Global review)*
- Market prices at the moment
 - 5 to 15 [\$/kg]

Cost analysis

- Based on 10 tons residues per week or 520 tons residues per year
- Total capital investment \approx 500,000 \$

Selling price	Return of Investment (ROI)	Payback period (PBP)	Venture profit (25% ROI)
4 [\$/kg]	58.1 [%]	1.7 [year]	165,000 [\$]
5 [\$/kg]	90.5 [%]	1.1 [year]	328,000 [\$]
6 [\$/kg]	122.9 [%]	0.8 [year]	490,000 [\$]

SWOT analysis

Strengths

Simple process
Economically feasible
Environmental friendly
Healthy product



Weaknesses

Lack of awareness
Temperature sensitive



Opportunities

Use with/for other residues
Upscaling – more residues
Optimization of process



Threats

Dependence of suppliers
Variability in nutrient content
Price variation



Final remarks

- Market potential
 - Simple process
 - Environmental friendly
 - Cheap – High ROI
- Product
 - Pure and healthy (no additives)
- Potential for the future
 - Use of other products