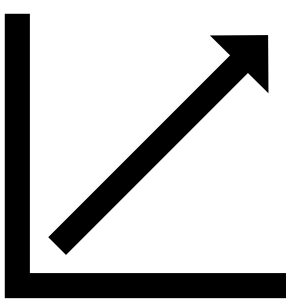


OBJECTIVE

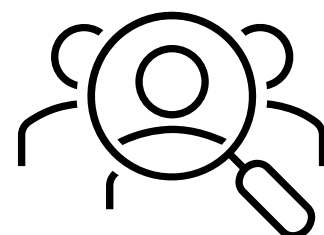
The objective of this project is to create passion fruit oil extract sunscreen which provides a natural alternative to sunscreen on the market.

BACKGROUND



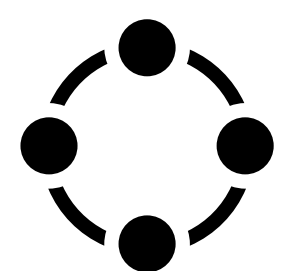
Market Size

The sunscreen market is expected to grow 11.8% in the next 5 years (Grand View Research, 2025)



Target Consumer

People interested in an alternative to synthetic sunscreen that also contains antioxidants that are beneficial for skin.



Competitors

Badger, Babo Botanicals, COOLA, Goddess Garden

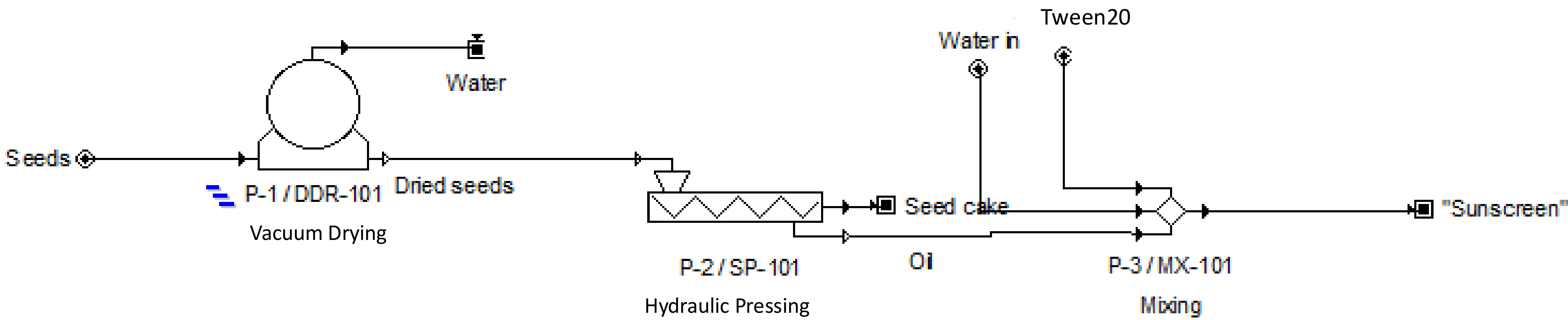
ETHICAL & SOCIETAL CONSIDERATIONS

- Locally sourced and recyclable packaging materials
- Following FDA Regulations
- Repurposed peels, seeds, and pulp for exfoliation products to minimize waste

FUTURE WORK

- Continue testing to increase SPF in sunscreen
- Research best packaging options

PROCESS FLOW DIAGRAM AND SCHEDULING



Drying

Chosen: Vacuum dryer
Alternatives: Convection dryer

Pressing

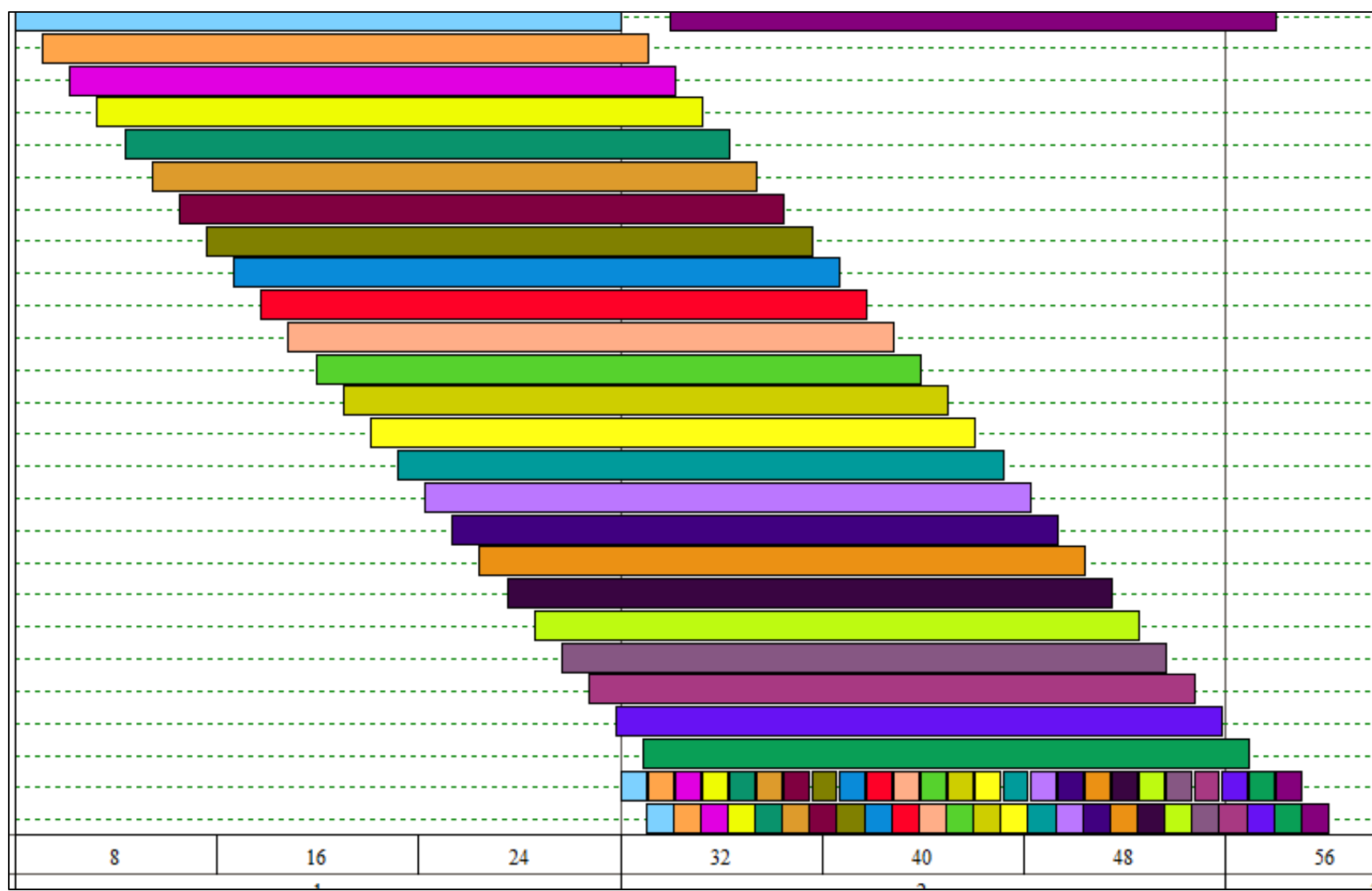
Chosen: Hydraulic press
Alternatives: Screw press, Extraction

Mixing

Chosen: Agitator/Vessel
Alternatives: Micro-encapsulation, Milling

Continuous Processing

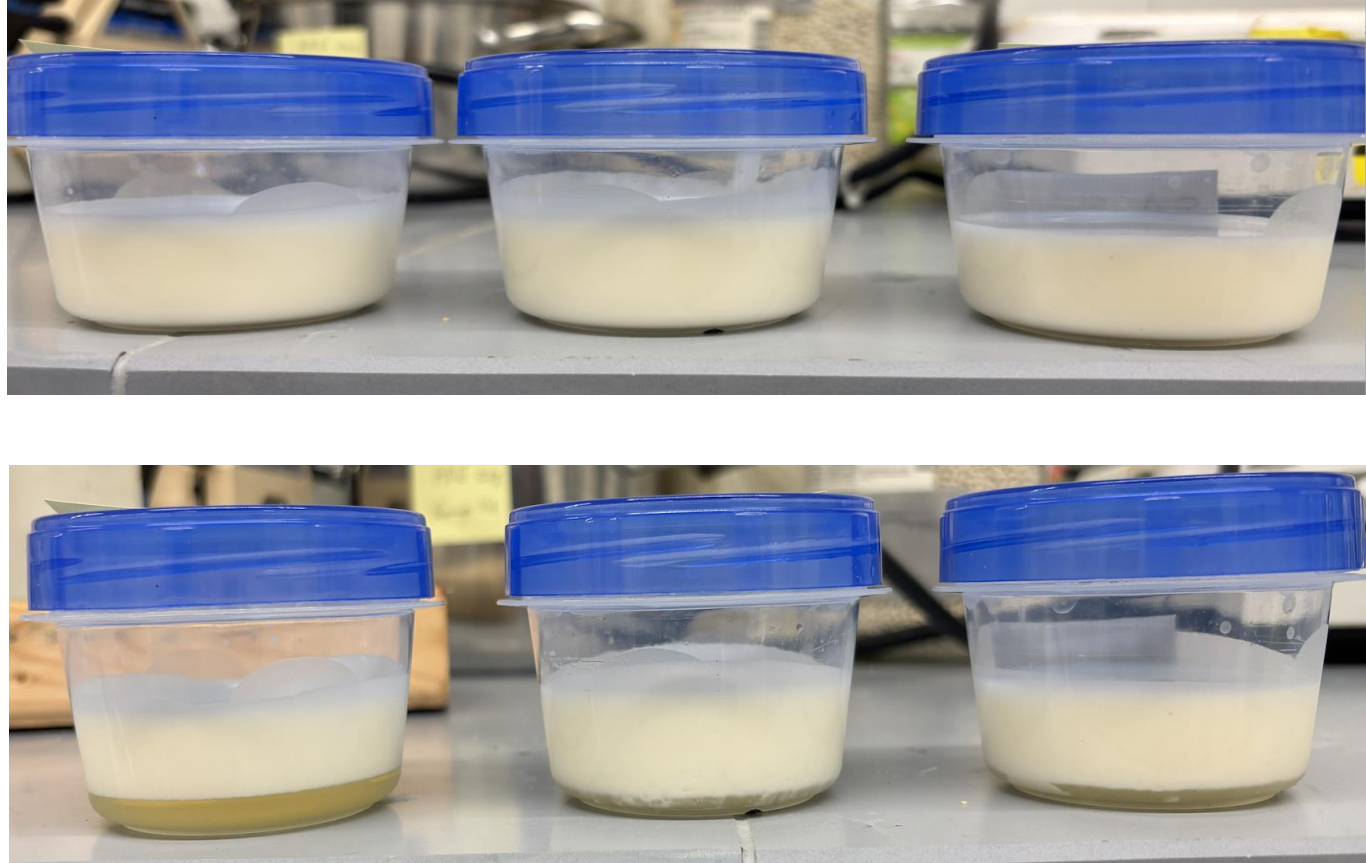
- 24 vacuum dryers
- 1 hydraulic press
- 1 agitation vessel



EXPERIMENTAL DESIGN

- Separate Pulp from Seeds:** Strained the seeds and collected the pulp and sugar water; froze pulp for later use
- Vacuum Drying Seeds:** Tested drying at 50°C and 60°C and for 20 and 24 hours
- Oil Pressing:** Tested force of 30 kN and 40 kN x2, 3 minutes each time
- Mixing:** varied mixing times, mixing speeds, and ratio of ingredients
- Quality Observations:** Took photos of product over the course of weeks; measured SPF

Product Ingredients: (by weight)
16.7% passion fruit seed oil, 16.7% Tween20, 66.6% water



Ingredient Ratio by Weight (oil:Tween20:water)	SPF
1:1:4	3.28
1:1:1	3.34

PROCESS OPTIMIZATION

Unit of operation	Optimization Variable	Optimal value
Drying	Area	6.67 m ²
Pressing	Time	1.6 hours
Mixing	Mixing speed, ingredient ratio	100 RPM, 1:1:4

MANUFACTURING

Economic Results

Financial Component	Value
Total Capital Investment	\$487,500
Total Production Cost per Year	\$1.2 billion
Sale Price per 8 oz	\$38.84

Financial Plan

