Conceptual Process Design of Mushroom Processing

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Background

Canning of mushroom contains processing steps such as blanching and cooking at which they are exposed to high temperature for a long time . This has an adverse effect on the yield.

As mushrooms contain high protein, their thermodynamic behavior can be expected to be analogous to that of meat which is described using Flory-Huggins' theory[1]. We assume that the Flory-Rehner theory equally applies to white button mushrooms.

With a proper understanding of thermodynamics involved in the yield, this project aims at a complete redesign of the mushroom processing.

Objective

Redesign of mushroom processing to get

- ❑ Higher Yield of processed mushroom
- ❑ More sustainable process

Approach

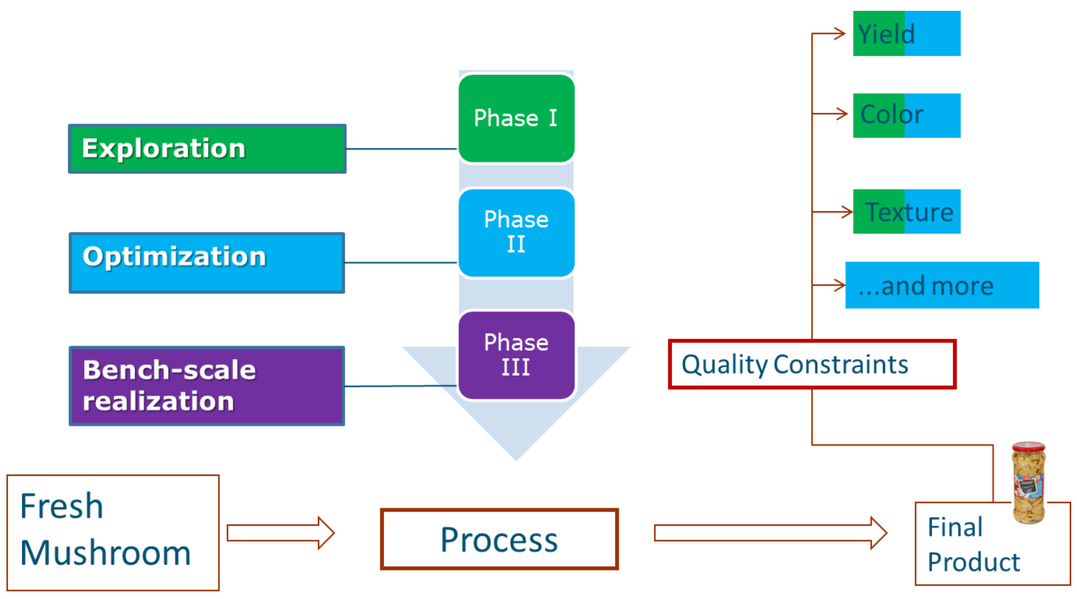

Figure 1: Conceptual process design approach in mushroom processing

Results

Storage condition:
RH: 99%
Temp: 4°C

1. Biological activity in mushroom

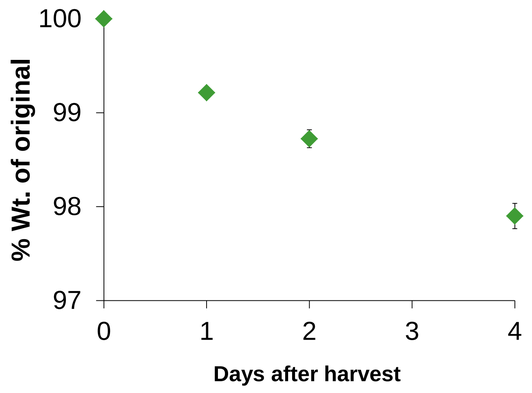

Figure 2: Change in weight of mushroom during storage

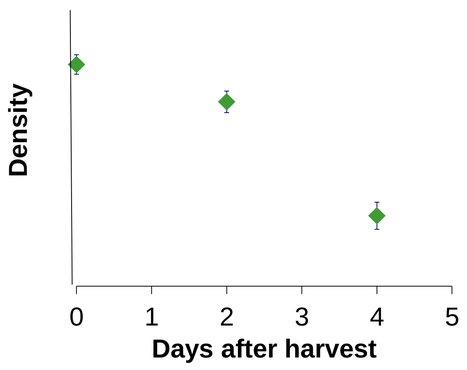

Figure 3. Change in density of mushroom cap during storage as determined by liquid displacement technique

2. Mushroom blanching

Blanching condition:
Temp: 90°C
Time: 15 min

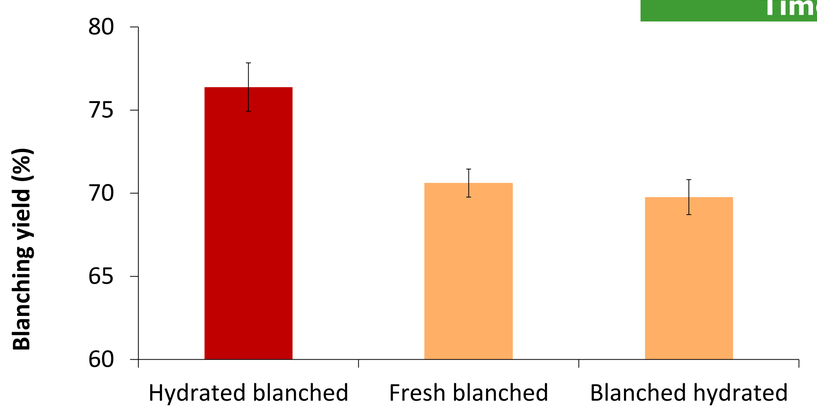

Figure 4. Yield of blanched (hydrated and fresh) mushroom. "Blanched hydrated" shows the yield of "fresh blanched" after they were vacuum hydrated

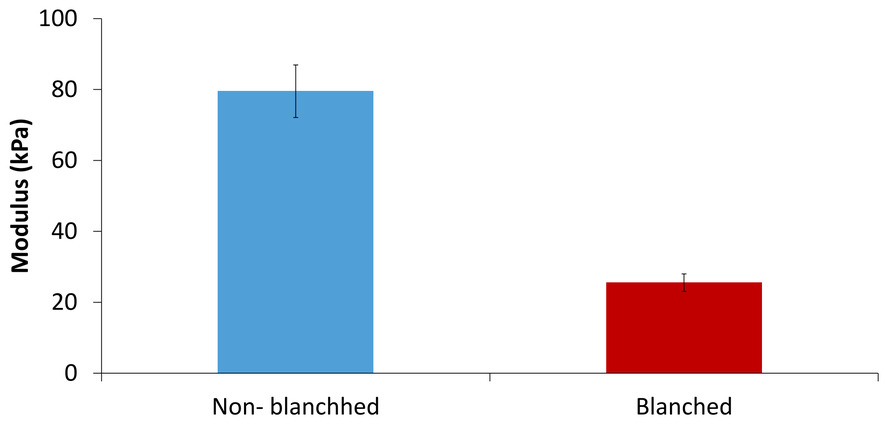

Figure 5. Elasticity in non-blanched (vacuum hydrated) and blanched mushroom cap

3. Blanching: Changes in water holding capacity

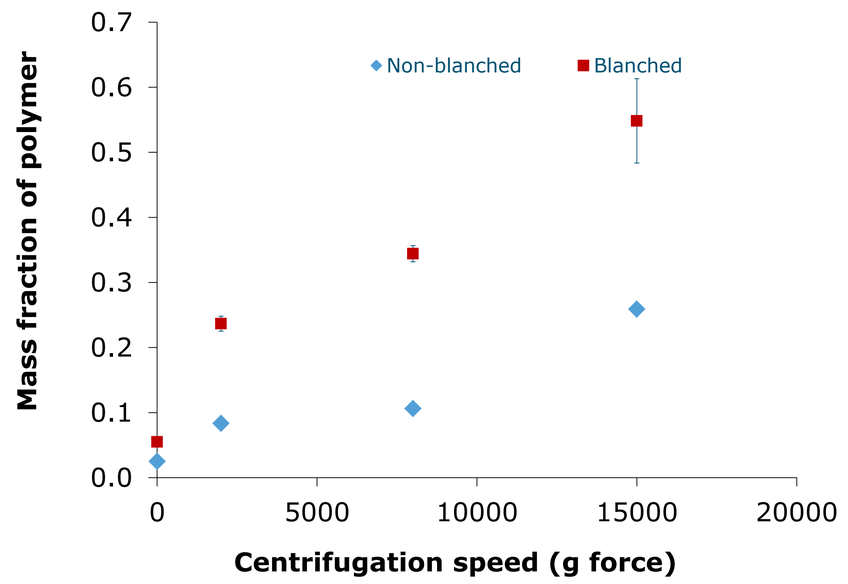

Figure 6. Mass fraction of polymers in mushroom cap that are subjected to various centrifugation speed at equilibrium

Conclusions

- Mushroom are very active biological entities
- Blanching destroys the porosity and elasticity of polymers in mushroom
- Blanching reduces the WHC of mushroom

Reference

1. R.G.M. van der Sman., *Thermodynamics of meat proteins.* Food Hydrocolloids, 2012. **27**(2): p. 529-535.

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