Bonbon Bouye: a Culturally Acceptable Peanut Nutrition Bar Developed with Senegalese Smallholder Women Farmers

Team:
Promoting Agricultural Transformation Holistically (PATH)
40% percent of harvest lost due to inadequate storage (WFP, 2020)

"25% of our cowpeas are then lost to insects" Senegalese smallholder women farmers

“We lost 2kg of our cleaned peanuts from late threshing” Senegalese smallholder women farmers
Mission

Collaborate with smallholder women farmers to develop a culturally-acceptable and nutritious peanut product to reduce the loss of their cowpeas and peanuts.
Bonbon Bouye
Indigenous Knowledge + Western Technology

Defining the research objective with community members

Central composite design with SAS 9.4 (SAS, Cary, North Carolina)
How was Bonbon Bouye Created?

Survey & focus group discussions: Diamal, Keur Serigne Djibel, Ndangane and Ngouye Siwakh

Recipe development & optimization

Final product

Process demo & discussion

Sensory test with school-age children and community
Western Technology: Recipe development

X1: Ratio of cowpea flour to corn flour

X2: Levels of baobab in (flour + baobab powder)
Solving Technical Challenges - Cohesiveness
Solving Technical Challenges - Shelf life

0.78 - Most bacteria

0.75 - Most molds
Solving Technical Challenges - Nutrition

Bonbon Bouye

Quaker Peanut Butter Baked Squares
“Both kids and moms will like it”
-Senegalese woman farmer

Groups with the same letters are not significantly different.
“not too sweet, very good” - Senegalese man farmer
Process Flow Diagram

1. Harvesting peanuts, cowpea, and corn
2. Roasting and grinding peanuts
3. Mixing ingredients
4. Milling into flour
5. Baking in brick oven
6. Packaging
7. Resting

Sanitation
CCP 1
CCP 2
CCP 3
Food Safety - HACCP

Critical Control Points (CCP)

CCP 1 ★
- Mature and undamaged seeds will be selected and dried to 7% moisture to control *A. flavus*
- Aflatoxin testing

CCP 2 ★
- Roast peanuts at 177°C for 20 minutes
- Sanitary post-harvest practices and seeds will be stored at 70% humidity between 25-27°C

CCP 3 ★
- Bake to 71.1°C to assure a >5D *Salmonella* kill
Impact: Reduce postharvest loss

- 40% cowpea
- 13% corn
- 15% peanut paste
Impact: Reduce postharvest loss

Selling Prices:
- $1.34 / kg
- $0.84 / kg
- $1.34 / kg
- $0.35 / package (133g)

Net Profit (USD)

- 200 kg Harvest to Main Ingredients: $282
- 120 kg Available Harvest to Main Ingredients: $124
- Bonbon Bouye from 80 kg cowpea, 10.4 kg corn and 12.6 kg peanuts: $463
Impact

Women empowerment

Nutrition for school-age children

Reduction of imported food products

Environment
### Capital Investment Estimate: CFA 1,484,707 / $2532.23

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Cost 1</th>
<th>Cost 2</th>
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</thead>
<tbody>
<tr>
<td>Solar dryer</td>
<td>CFA 42,500</td>
<td>$72</td>
</tr>
<tr>
<td>Roaster</td>
<td>CFA 232,207</td>
<td>$400</td>
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<tr>
<td>Motorized mill</td>
<td>CFA 180,000</td>
<td>$309.38</td>
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<tr>
<td>Utensils</td>
<td>CFA 30,000</td>
<td>$50.85</td>
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<tr>
<td>Baking oven</td>
<td>CFA 1,000,000</td>
<td>$1,700</td>
</tr>
</tbody>
</table>


Economic Feasibility

Cumulative Profit for 10 Households (USD)

- Nov, 5 kg: $289
- Dec, 5 kg: $579
- Jan, 10 kg: $1158
- Feb, 20 kg: $2315
- March, 20 kg: $3473
- April, 20 kg: $4630

Break-even point

80 kg of cowpea converted to Bonbon Bouye
So What’s Next?

2020

Building oven
Empower women through ownership

2021

Vitamin A and Zinc fortification
Improve vitamin A and Zinc content of Bonbon Bouye

2021

School feeding program
Partnership with the A.K.F. Wakhinane School

2022

Scale up to other regions
“Americans come to us and do research, but they just bring our food away. We hope you can stay with us and do value-added processing here instead”

-Chief of Ngouye Siwakh
Team PATH

Edwin Allan
Sustainable Food Systems
Expertise: Product dev. & testing

Emily Raber
Dietetics
Expertise: Nutrition evaluation

Amber Clifton
Dietetics
Expertise: International dev., Recipe dev.

Haley Darlinton
Chemical Engineering
Expertise: Process optimization

Cullen Kinnare
Food and Nutrition
Expertise: Recipe dev.