Enhancing nutritional qualities of sorghum products for hindering malnutrition in eastern Ethiopia

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Adama
Overview of Malnutrition

Major Causes

Activities /projects

Conclusion
INTRODUCTION

❖ The global population is exponentially increasing. (Ala and Ridwan, 2020)

As a result, Food production expected to increase with the same rate to feed.
However, Food production is facing a challenge to feed *exponentially growing population*

Millions of people in developing countries in general continue to suffer from **poor nutrition & food shortage**
Climate Change

Limited adoption of nutritious and drought resistant crops

Postharvest loss

Less Awareness

Less access to nutritious food

Poor feeding habit

Major Factors
37.9% of pregnant women were **Iron** deficient

- Malnutrition is cause for more than 50% of **infant and child deaths**
- >55% Vitamin A deficient and >48.1% were stunted

- 65% of the total HHs are categorized as food and nutrition insecure

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Ethiopia loses an estimated **55.5 billion ETB/year**
Most part of East Ethiopia is water stressed area.

Due to this farmers producing drought tolerant crops that are dominantly sorghum.

90% of the crop land in Hararghe is occupied by sorghum

Consequently, daily diets are heavily dependent on sorghum budena (Injera)

This is for all age groups !!

But nutrient compositions of grain (sorghum) is inadequate to meet the nutrients requirement.
Therefore, households relying on this crop as their staple food are facing widespread **malnutrition and related health problems**.

**Food based approach (intervention):**

- It has been found succeeded and
- Sustainable in reducing Malnutrition/ micronutrient deficiencies as public health problems (improving nutrition status).
Due to its:

✓ High acceptability,
✓ Low cost and
✓ Sustainability of complementing the commonly consumed and indigenous foods with locally produced nutrient dense (Biofortified) crops

It is effective strategy to improve nutritional qualities of grain products including sorghum

Moreover, this approach promote self-sufficiency and food and nutrition security.
Sorghum is dominantly produced and consumed in the area

- Sorghum is the fifth most important cereal crop in the world and
- Used by rural farmers, who often don’t have the means to feed themselves with other food sources rich in protein, vitamins and minerals.
Sorghum budena is commonly consumed traditional food for all age group.

However, nutrient compositions of sorghum are inadequate to meet the nutrients requirement.
Sorghum based food Products

It can be ingredient for different food products

- Bread
- Pasta products
- Infant food
- Cookies
- Porridge
- Budena
- Ingredient for beer
Orange-fleshed sweetpotato (OFSP) is a special type of biofortified sweetpotato that contains high levels of beta-carotene.

**Orange-fleshed sweetpotato (OFSP)**

- Nutritious
- Have high yield
- Climate resilient root crop
Products Orange fleshed sweet potato

- Bonbolino
- Sanbusa
- Flatted bread
- Bread
- Injera with teff
- Piza
- Infant food

It can be ingredient for different products
Ongoing activities on formulating and enhancing nutritional value of sorghum based food products

1. Improving Nutritional Value of Sorghum Budena Complementing With OFSP
2. Promotion of OFSP Blended Sorghum Budena in East Hararghe
3. Sorghum based cookies
4. Sorghum as adjuncts in beer
5. Reducing postharvest loss of crops in east and west hararghe
6. Formulating sorghum based nutritious food
Overall objective of the activity

➢ Develop and promote OFSP blended sorghum budena and infant food among selected householders in four districts of East Hararghe, Ethiopia

✓ Implemented in collaboration with CIP
✓ Financially supported by SMIL/ EIAR
Improving Nutritional Value of Sorghum *Budena* Complementing With OFSP

**Key activities**

- Conduct launching meeting with stakeholders/partners
- Conduct ToT for DAs, Health Extension Workers and experts on the preparation and consumption of sorghum products enriched with OFSP puree
- Train women/mothers from selected HHs on preparation and consumption of sorghum products enriched with OFSP puree
- Promote OFSP blended sorghum injera among low income rural and urban consumers using cooking demos, rural/urban markets and around health facilities
- Prepare and distribute promotional materials (e.g., flyers in local language) to create demand and awareness about the benefits of sorghum enriched with OFSP
- Conduct a study on consumer acceptability and economic feasibility of OFSP blended sorghum "budena"
- Develop and disseminate/share good lessons / success stories
**OFSP blended sorghum Budena Making procedure**

- **Sample preparation:** sorted, cleaned and stored
- **Milling**
- **Boiling and mashing**

**Sorghum:OFSP** Puree ratio
- 100:0
- 90:10
- 80:20
- 70:30

*(Yetneberk, et al., 2004)*

**Dough making & fermentation**

**Injera making**

**Lab analysis**

*Neela & Fanta (2021)*
Budena Making

Lab analysis using international standards
result

- Significant differences were found among the products, the fat, protein and fiber contents, which tended to reduce with the increase in OFSP ratio.

- Whereas the carbohydrate content rose as the proportion of OFSP puree was increased.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Ca</th>
<th>Fe</th>
<th>Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td>L₀ = Local variety 100%</td>
<td>20.1±0.1^g</td>
<td>5.8±1.5^b</td>
<td>3.1±0.1^b</td>
</tr>
<tr>
<td>M₀ = Melkam variety 100%</td>
<td>OFSP:L₁</td>
<td>27.6±0.9^f</td>
<td>10.4±0.7^b</td>
</tr>
<tr>
<td>OFSP:L₂</td>
<td>33.8±0.1^de</td>
<td>12.3±0.4^bc</td>
<td>3.7±0.1^bc</td>
</tr>
<tr>
<td>OFSP:L₃</td>
<td>41.7±0.5^bc</td>
<td>12.9±1.3^bc</td>
<td>3.5±0.0^bc</td>
</tr>
<tr>
<td>M₀ = Melkam variety 100%</td>
<td>OFSP:M₁</td>
<td>37.7±0.2^cd</td>
<td>12.4±2.6^bc</td>
</tr>
<tr>
<td>OFSP:M₂</td>
<td>44.9±0.5^b</td>
<td>10.4±1.1^cd</td>
<td>2.5±0.0^d</td>
</tr>
<tr>
<td>OFSP:M₃</td>
<td>33.1±0.7^e</td>
<td>11.7±0.3^bc</td>
<td>2.4±0.1^cd</td>
</tr>
<tr>
<td>LSD</td>
<td>4.54</td>
<td>4.54</td>
<td>0.60</td>
</tr>
<tr>
<td>CV</td>
<td>6.10</td>
<td>12.0</td>
<td>9.66</td>
</tr>
</tbody>
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Adding OFSP in sorghum flour for *budena* preparation enhanced the mineral content.
Tannin (mg/100g) and β-carotene (µg/100gm) content of Budena made from different proportions of sorghum flour and OFSP puree

- The increase in the ratio of OFSP puree enhanced β-carotene of the final products
- In sorghum, Tannin content is highly positively correlated with color and negatively with taste, while high starch content was more related to softness and rollability (Fox et al., 2019)
Effects of OFSP puree proportion on Sorghum Budena’s Sensory Acceptability

**Top appearance** (surface smoothness and eye) of sorghum *budena* (*Melkam* variety) blended with OFSP.

*Budena* prepared from 20% OFSP puree in both sorghum varieties provides superior sensory acceptability in all sensory attributes such as color, appearance, texture and taste.

**Underneath view** of sorghum budena (*Melkam* variety) blended with different ratio of OFSP.
Sorghum *budena* made from sorghum flour blended with OFSP puree is more nutritious than sorghum alone.

Moreover, Sorghum *budena* with high nutrition quality and greater sensory acceptability can be prepared by complementing with OFSP puree.

Consuming such products could increase access to and intake of vitamin A rich food among the most vulnerable groups, pre-school children, to alleviate malnutrition and related health problems prevalent in the area.
Promotion and other remaining activities will be conducted soon as resources are availed
Other on-going small activities on sorghum

Sorghum with OFSP based cookies

Sorghum Adjunct for beer
One of the Objective is:

- Identification of innovative and endogenous approaches to reduce postharvest loss East and west Hararghe, Ethiopia

✓ Financially supported by Mercy Corps
Healthy food factory

Sorghum Based

Rationale

- Limited and high cost of nutritious food (imported !)
- Serious malnutrition problem in eastern Africa
- High postharvest loss of perishable crops (>50%)
- Demand of school feeding
- Very limited such food company
- High market demand in East Africa

Vision

The Biggest Nutritious food company in Africa
Conclusion

❖ Formulating or enriching commonly consumed sorghum based products with locally produced nutrient dense food sources and promoting will enhance food and nutrition security.

❖ There are many of other alternative uses of sorghum such as novel foods, processed foods, infant food, and industrial uses – starch and beverages (beer).

❖ Thus, commercialization of alternative food and industrial products is one of the ways to increase demand for sorghum.

❖ Moreover, commercializing sorghum will improves the livelihood of the farmers by raising their income.
Thank you!