Translating R4D in Food Security

(Agricultural and Nutritional Resilience)

Research for Development at the Food Processing, Training & Incubation Centre, University of Eldoret, Kenya

By

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• Food security is a complex sustainable development issue and is linked to the 17 SDGs, linked to health through malnutrition, but also to sustainable economic development, environment, and trade.

In FS-R4D, a research team endeavors to pursue as many SDGs as they possibly can, mapping out the problem using primary data.
The R4D Problem: High global prevalence of vitamin A, iron and zinc deficiency

Vitamin A Deficiency
190 million (33.3%)
Pre-school age children

19.1 million (15.3%)
Pregnant women

Iron Deficiency
273,000 deaths: 45% in Southeast Asia, 31% in Africa (2004 report)

Zinc Deficiency
> 450,000 deaths annually in children <5 years of age (worldwide)

Vitamin A deficiency causes 600,000 early childhood deaths and blindness in 500,000 children each year.

Sources:
WHO Global Database, http://whqlibdoc.who.int/publications/
Harvest Plus. http://www.harvestplus.org/content/zinc
R4D: Creating successful models using food and nutrition-related technologies to enable us to tackle the relevant malnutrition problem

- Using a Food Systems approach to curb postharvest losses.
- Expand cereal/veges/fruit markets in urban/rural Kenya through application of diversified food technology.
- Improve nutritional quality of food products.
- Enable a market-pull for food fortification
- Support entrepreneurship.
R4D: Strategies to alleviate micronutrient deficiencies

Dietary Diversification

Commercial Fortification

To possibly translate to a presence in the market??

### B: Using plants within the food system as natural fortificants

<table>
<thead>
<tr>
<th>Plant species</th>
<th>Vitamin A (ug RE)</th>
<th>Zn (mg/g)</th>
<th>Fe (mg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amaranthus sp.</td>
<td>327</td>
<td>0.02-8.4</td>
<td>0.3-3.8</td>
</tr>
<tr>
<td>Arachis hypogea</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bidens pilosa</td>
<td>301-985</td>
<td>0.9-2.6</td>
<td>162-340</td>
</tr>
<tr>
<td>Brassica sp</td>
<td>-</td>
<td>0.9-1.3</td>
<td>27-31</td>
</tr>
<tr>
<td>Mangifera indica</td>
<td>1090.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chenopodium album</td>
<td>316</td>
<td>1.4-18.5</td>
<td>2.2-6.1</td>
</tr>
<tr>
<td>Cleome sp</td>
<td>1200</td>
<td>0.6-0.8</td>
<td>2.6-2.9</td>
</tr>
<tr>
<td>Cucurbita pepo</td>
<td>194</td>
<td>2.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Carica papaya</td>
<td>447.6</td>
<td>trace</td>
<td>0.4</td>
</tr>
<tr>
<td>Galinsoga parviflora</td>
<td>-</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>Ipomoea batatas (OFSP)</td>
<td>103-980</td>
<td>0.03-3.1</td>
<td>0.6-1</td>
</tr>
<tr>
<td>Manihot esculenta</td>
<td>1970</td>
<td>0.34</td>
<td>-</td>
</tr>
<tr>
<td>Daucus carota</td>
<td>3057.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Senna occidentalis</td>
<td>-</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Solanum sp</td>
<td>1070</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sonchus oleracea</td>
<td>985</td>
<td>0.5</td>
<td>2.7</td>
</tr>
<tr>
<td>Vernonia sp.</td>
<td>-</td>
<td>0.08</td>
<td>0.8-3.2</td>
</tr>
<tr>
<td>Vigna unguiculata</td>
<td>99</td>
<td>0.23</td>
<td>0.3-3</td>
</tr>
</tbody>
</table>

The Technology premise: Food Processing can help to reach “target” consumers and create a “value chain” (Farmer-Processor-Consumer Chains)

Inputs suppliers

Farmers

Central Selling Units

Rural Wholesalers

Producers organization

Processor’s organization

Equipment suppliers

Exports

ITA

Fair

City shop

Retailers

½ Wholesalers

Urban Wholesalers

Intermediates

Mini-market

Weekly market

Consumers

NGO AND DEVELOPMENT PARTNERS

Financial institutions

Urban Wholesalers

Processor’s organization

Courtesy of H. de Groote (2016)
Research and Product Development at scale-up.

At this stage, stakeholder engagement is necessary.

**Figure 2: Scaling Up Approaches and Methods of Scaling Up R&D Products at FPTIC**

<table>
<thead>
<tr>
<th>Type</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion</td>
<td>• Growth</td>
</tr>
<tr>
<td></td>
<td>• Restructuring</td>
</tr>
<tr>
<td></td>
<td>• Franchising</td>
</tr>
<tr>
<td></td>
<td>• Spin-off</td>
</tr>
</tbody>
</table>
R4D _ Training women/young Entrepreneurs

- Innovative food product development is continuously undertaken using a systems approach so as to produce nutritionally enhanced biofortified cereal products plant-based processed natural fortificants in order to enhance nutrition in the product thus help in curbing malnutrition among consumers.

- The purpose of the Centre is to develop a variety of cereal formulations with the aim of getting naturally fortified nutrient rich products with a market demand.

All the knowledge used in training emenates from development research.
R4D-Engaging with rural smallholders-Gender and all age inclusive

Nutrition education
Develop nutritious products using a food systems based approach,

"Engage-enable the community"
From research4d
To training
Current Products

Incubatee’s brand label “Nefer wellness”
**Take away messages for R4D**

- Embrace science and technology and local knowledge.
- Understand the “consumer” and the community and meet them where they are.
- Look for opportunities for changes in products to meet nutrient needs in unique ways.
- Train, and incubate for potential entrepreneurs for sustainable production and consumption.
- Foster partnerships with key entrepreneurs and global partners.
- Push and pull for biofortified crops to reach consumers at market.
Training Entrepreneurs using Knowledge from Research done
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THANK YOU