Seeds, Stems and Vines: Incorporating Biofortification Into A Project

SPRING

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Micronutrient Deficiencies: 2 Billion People

**Vitamin A deficiency**
- Supplements reduced child *mortality* by 23%
- 375,000 children go blind each year; compromised immunity

**Iron deficiency**
- *Impaired cognitive abilities* that cannot be reversed
- 82% of children < 2 years in India are anemic; anemia also contributes to maternal mortality

**Zinc deficiency**
- increased *incidence/severity diarrhea/pneumonia; stunting*
- 2 billion people at risk; 450,000 deaths per year
Biofortification – The Process

- Constant process of crop breeding to improve yield and resistance to pests, diseases, climate
- Innovation for health: adding nutrition as a desirable breeding trait
- New varieties developed in CG centers, then transferred to countries
- National Agricultural Research Services (NARS) conduct
  - crossing/adaptive breeding
  - test for 2 to 3 years in different terrain, soil, climate
Crops for Africa & Release Dates

**2011**
- Cassava
- Vitamin A
- Nigeria
- DR Congo

**2012**
- Beans
- Iron (Zinc)
- Rwanda
- DR Congo

**2012**
- Maize
- Vitamin A
- Nigeria
- Zambia

Crops are high-yielding and with other traits farmers want.
Crops for Asia & Release Dates

2012
- Pearl Millet
- Iron (Zinc)
- India

2013
- Rice
- Zinc
- Bangladesh

2013
- Wheat
- Zinc
- India
- Pakistan

Crops are high-yielding and with other traits farmers want.
### Other Biofortified Crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Nutrient(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato</td>
<td>Iron</td>
</tr>
<tr>
<td>Lentil</td>
<td>Iron, Zinc</td>
</tr>
<tr>
<td>Sorghum</td>
<td>Iron, Zinc</td>
</tr>
<tr>
<td>Banana/Plantain</td>
<td>Vitamin A</td>
</tr>
<tr>
<td>Cowpea</td>
<td>Iron, Zinc</td>
</tr>
</tbody>
</table>
Global Reach of Biofortification

NUTRITIOUS STAPLE FOOD CROPS: WHO IS GROWING WHAT?

These crops have been conventionally bred to be rich in essential vitamins and minerals that are needed for good health.
Biofortification - the Evidence

- Breeding increases nutrient levels without reducing yield
- Extra nutrients in crops improve micronutrient status
- Farmers are growing biofortified crops, and consumers are eating them
- Biofortification is cost-effective: central, one-time investment
Iron Pearl Millet Reverses Iron Deficiency

- Lack of iron impairs mental development and learning capacity, and increases weakness and fatigue.

- A new study found that iron pearl millet was able to reverse iron deficiency in children aged 12-16 years in India within six months.
Vitamin A OSP Reduces Diarrhea

- Diarrhea is one of the leading causes of death in children < 5 in developing countries.

- Eating orange sweet potato (OSP) reduces the incidence and duration of diarrhea in children.
  - **For children < 3** likelihood of developing diarrhea was **reduced by more than 50%** and duration of diarrhea reduced **by more than 25%**.
  - **For children < 5** likelihood of developing diarrhea was **reduced by more than 40%** and duration of diarrhea reduced **by more than 10%**.
Which Nutrients, Crops, Countries?

Frequently Asked Questions

• Not genetically modified
• Can’t “overdose”
• Supports, not undermines, biodiversity and dietary diversity; not just “making bad food better”
• Visible vs Invisible traits affecting consumer acceptance
Actors

1. International financial institutions
   - World Bank
   - IFAD

2. Multi-lateral agencies
   - World Food Program
   - Codex

3. Regional Frameworks
   - African Union

4. National Governments
   - Brazil
   - China
   - India

5. NGOs
   - World Vision
   - Land O’Lakes

6. Private Sector
   - Nirmal Seed
   - Zamseed
Incorporating in Programming
Breeding to Consumption

Breeding of Biofortified Varieties

Official release by government

Seed Multiplication

Bringing Seeds to Farmers

Production / Post-harvest Handling

Promoting Consumption
Seed Multiplication

- NARS provide access to released seed / stems / vines for multiplication
- Multiplied and accessed through:
  - Seed companies
  - CBO / farmer groups
  - Government agencies
• Capacity building needed with multipliers
• Different seed quality available
  – Quality declared seed
  – Certified seed
Bringing Seeds to Farmers

- Delivered by commercial and non-commercial sources
  - Seed companies
  - Agrodealers
  - Farmer to farmer
  - Project / NGOs
  - Government systems
Encouraging Production

- Creating demand for biofortified seeds with farmers
  - Extension staff training
  - Farmer training
  - Nutrition messaging integrated with agronomic and marketing messages / training
Post-harvest and Processing

• Training and capacity building of farmers and commercial entities
  – Post-harvest handling
  – Processing methods
Linking to Markets

- Link to local market
- Link to institutional buyers
  - Schools
  - Hospitals
  - Prisons
- Food processors
- WFP – Purchase for Progress
Promoting Consumption

• Innovative campaigns are needed to encourage both production and consumption by target community
• Many tested methods: radio dramas, print, community theatre, other media, consumer tasting / cooking demos

Consumer tasting sessions with Orange Sweet Potato in Uganda

HarvestPlus / Nollywood collaboration on Yellow Cassava in Nigeria

HarvestPlus joint roadshow with afroPop, rap, R&B musicians to promote iron beans in Rwanda
ICT for Agriculture

• Linking farmers to seed
  – Beep2Seed

• TRAC FM – real time consumer feedback

Which single crop would you suggest Florence to grow?

NOTES for presenter - in English, please read through and translate. Make sure instructions are clear.

Before the drama
Briefly recap on the previous episode and repeat the previous question and results of the poll. 91% voted for Florence, 9% voted for Roland. Now let’s see if Roland is properly caring for his family.

mention that we will listen to a new episode where the story continues and that there will be a new poll question to which people can respond for FREE! This time, even a prize will be given to some of the participants (airtime).

AFTER THE EPISODE
Briefly discuss what happened during episode 2 especially going into the second part where it is suggested that Florence should provide a nutritious diet to her children. Bridge this to the following question.

Question
Since Florence cannot buy all the necessary nutritious foods to provide a healthy meal (diet) for her children, which single crop would you suggest her to grow?
A: Millet
B: Orange sweet potato
C: Mais
D: I don’t know
Improved Agricultural Technology

- Labor saving devices – stem cutter / wheelbarrow (cassava)
- Clean tissue culture (orange sweet potato)
Improved Agricultural Technology

- Roaster (cassava)
- Affordable extruders for food processing
- Seed swap
- Electronic market/database (cassava)
- Moisture meters
Implementation - the Road Ahead

• Private sector investments in plant breeding and seed marketing of a range of biofortified products with standards/quality control
• Mainstreaming of biofortification by
  • public sector agricultural research
  • NGOs and multi-lateral institutions
• Advocacy and other support by national governments and regional organizations
• Creating consumer demand (advertising, governments, NGOs)
• Generating evidence/experience, then sharing this information across countries and regions
Thank You!

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