The CGIAR

• Today I will be speaking about the HarvestPlus Challenge Program, one of the partnership programs supported by the CGIAR
• Outline what HarvestPlus is about
• Issues of partnerships within HarvestPlus
The CGIAR

• The Consultative Group on International Agricultural Research (CGIAR), established in 1971, is a strategic partnership of countries, international and regional organizations and private foundations supporting the work of 15 international agricultural research Centers.
The CGIAR

- In collaboration with national agricultural research systems, civil society and the private sector, the CGIAR fosters sustainable agricultural growth which benefits the poor through:
  - Higher incomes (higher-yielding crops)
  - Better food security (supplies/prices)
  - Improved management of natural resources
  - **Better human nutrition and health**

**A Massive Problem**

- **Zinc**
  - Estimated 2 billion

- **Iron**
  - Estimated 2 billion

- **Vitamin A**
  - 500,000 children each year

- **Iodine**
  - Estimated 1.5 billion
Consequences of Micronutrient Malnutrition

- More illness and disease
- Higher mortality
- Lower cognitive ability
- Capacity for physical labor reduced
- Growth hindered—stunting
- Poorer reproductive health
- Death
- Decline in productivity → lower GDP

How Important is Nutrition for Health?

Undernutrition’s impact on post neonatal child deaths by illness

53% of all deaths are directly caused by undernutrition in diseased children

J.P. Habicht, Cornell University 2008
% Changes in Cereal & Pulse Production & in Population Between 1965 & 1999

Indices of Inflation-adjusted Prices for Bangladesh
1973-75 = 100
Share of Energy Source & Food Budget in Rural Bangladesh

Energy Source
- Staple foods
- Non-Staple plants
- Fish and Meat

Food Budget
- Staple foods
- Non-Staple plants
- Fish and Meat

What people eat and what it costs

Germany: $500 / week

Chad refugee camp: $1.23 / week

Ecuador: $31.55 / week

Source: Hungry Planet. P. Menzel and F. D’Aluisio
Real world cereal prices projected to rise

![Graph showing cereal prices](source: M. Rosegrant, IFPRI 2007)

An additional weapon to fight deficiency:

- Supplementation
- Commercial Fortification
- Dietary Diversity
- “Biofortification”
HarvestPlus Biofortification Strategy

Breed micronutrient dense staple crops with higher levels of vitamin A, iron, and zinc that will improve human nutritional status when eaten.

HarvestPlus is working to move millions from deficient to sufficient
Cost-Benefit Calculations

• Move 1% of 1 billion people across line for one year:
  – 10 million x $20 = $200 million
• Move 10% of 1 billion people (e.g. India) across line for ten years:
  – 100 million x $20 x 10 year = $20 billion

Advantages of Biofortification

• **Targets the poor** who eat high levels of food staples
• **Rural-based**: where 75% of the malnourished populations live
• **Cost-effective**: research at a central location can be multiplied across countries and time
• **Sustainable**: investments are front-loaded, low recurrent costs
Phase I Crops
- Rice
- Wheat
- Maize
- Cassava
- Sweet Potato
- Beans
- Pearl Millet

Phase II Crops
- Potato
- Sorghum
- Banana/Plantain
- Lentils
- Groundnuts

Barley, Cowpea, Pigeon Pea, and Yams have been dropped

PRODUCTS FOR ASIA
Zinc Biofortified
- Rice
- Wheat

Iron Biofortified
- Pearl Millet-India
- Lentil

Zinc rice
PRODUCTS FOR AFRICA

Provitamin A Biofortified
• Sweetpotato
• Maize
• Cassava
• Banana/Plantain

Iron Biofortified
• Bean
• Potato
• Sorghum

After 4 years

• Can breeding increase nutrient levels to high enough levels?

• Will the extra nutrients be absorbed at sufficient levels to improve micronutrient status?

• Will farmers adopt and will consumers buy/eat in sufficient quantities?
## HarvestPlus Milestones By Crop
### Year 4 of 15

<table>
<thead>
<tr>
<th>STEP</th>
<th>Sweet Potato</th>
<th>Beans</th>
<th>Pearl Millet</th>
<th>Cassava</th>
<th>Rice</th>
<th>Maize</th>
<th>Wheat</th>
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<tbody>
<tr>
<td>Breeding</td>
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</tbody>
</table>

## Schedule of Product Releases

<table>
<thead>
<tr>
<th>Crop</th>
<th>Nutrients</th>
<th>Release Year of Initial Lines*</th>
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</thead>
<tbody>
<tr>
<td>Sweetpotato</td>
<td>Pro-vitamin A</td>
<td>2007</td>
</tr>
<tr>
<td>Bean</td>
<td>Iron, Zinc</td>
<td>2010</td>
</tr>
<tr>
<td>Pearl Millet</td>
<td>Iron, Zinc</td>
<td>2011</td>
</tr>
<tr>
<td>Cassava</td>
<td>Pro-vitamin A</td>
<td>2012</td>
</tr>
<tr>
<td>Rice</td>
<td>Zinc, Iron</td>
<td>2012</td>
</tr>
<tr>
<td>Maize</td>
<td>Pro-vitamin A, Zinc, Iron</td>
<td>2013</td>
</tr>
<tr>
<td>Wheat</td>
<td>Zinc, Iron</td>
<td>2013</td>
</tr>
</tbody>
</table>

* Approved for release by national governments after 2-3 years of testing
Institutional and Coordination Issues

Partners
• Scientists
• Implementing Agencies
• Donors
  – Those Responsible for Ensuring Accountability

Is the major impediment to the success of HarvestPlus:

1. Scientific discovery
2. Getting people on the same page and working together (institutional structures)
A Global Interdisciplinary Effort

- Plant Breeders
- Molecular Biologists
- Food Technologists
- Human Nutritionists
- Experts in Food Product Development & Marketing
- Communicators
- Economists

HarvestPlus Management Team

CIAT
1. Breeding
2. Biotechnology
3. End-User Coordinators

Program Director

IFPRI
4. Nutrition
5. Impact and Policy
6. Communications Coordinators

Facilitation
Monitoring
Information Exchange

Wheat Rice Beans Cassava Maize Sweet potato
## HarvestPlus:
Coordinating a Multidisciplinary Program

<table>
<thead>
<tr>
<th>Function</th>
<th>Rice</th>
<th>Maize</th>
<th>Wheat</th>
<th>Cassava</th>
<th>Sweet Potato</th>
<th>Bean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Breeding</td>
<td>IRRI</td>
<td>CIMMYT</td>
<td>CIMMYT</td>
<td>CIAT</td>
<td>CIP</td>
<td>CIAT</td>
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<tr>
<td>2. Biotechnology</td>
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<tr>
<td>3. Food processing</td>
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<tr>
<td>4. Human nutrition</td>
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<td>5. Reaching end-users</td>
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<tr>
<td>6. Impact/policy</td>
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<tr>
<td>7. Communication</td>
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</tbody>
</table>

### Institutions For Sweetpotato

<table>
<thead>
<tr>
<th>Plant Breeding</th>
<th>CIP (Peru, Kenya, Mozambique, India), NARES in Uganda, Kenya, India, Indonesia, Philippines, Brazil, China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>Food Processing</td>
<td>Campinas University, EMBRAPA (Brazil); Food and Nutrition Center (Tanzania); Medical Research Council (South Africa); CIP (Peru)</td>
</tr>
<tr>
<td>Human Nutrition</td>
<td>Medical Research Council (South Africa); UC Davis (USA); ICDDR,B (Bangladesh)</td>
</tr>
</tbody>
</table>
Institutions For Sweetpotato

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension/Seed Systems</td>
<td>CIP (Kenya), ASARECA, VEDCO (Uganda), World Vision (Mozambique)</td>
</tr>
<tr>
<td>Market and Product Development</td>
<td>University of Greenwich (UK); VEDCO (Uganda); World Vision (Mozambique)</td>
</tr>
<tr>
<td>Demand Creation</td>
<td>IFPRI (USA), Makerere University (Uganda); Helen Keller International (Mozambique)</td>
</tr>
<tr>
<td>Measuring Impact</td>
<td>IFPRI (USA), CIP (Kenya), Makerere University (Uganda), World Vision (Mozambique)</td>
</tr>
</tbody>
</table>

Cohesion Among Crop Teams

- Sharing a **common vision** is very important to motivate “unselfish” behavior
- Opportunities for **learning across disciplines** is important
  - Example: Crop targets may change as new research becomes available
- **Constraints**
  - Different institutions, different disciplines
  - Need to publish in a narrow field
  - Need to keep institutional directors happy
Cohesion Among Crop Teams

Regular Communication is vitally important

• Crop meetings (18-month intervals)
  • Maize, Zambia, March
  • Wheat, Turkey, June
  • Sweetpotato, South Africa, October
  • Rice, Thailand, November

• Intranet platform (Harvestplus “Hub”)
  – Documents, discussions

• Weekly, sometimes daily contact by e-mail

Sustainability – HarvestPlus Country Programs

Coordinated Multi-Crop Activities

• India – government budgetary support ($15 million over five years)

• China – willingness to move quickly, strong scientific infrastructure

• Brazil – EMBRAPA (federal) is well-funded, as well as State agricultural research institutes
### Funding
($million for 2003-2008)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Gates Foundation</td>
<td>$38.7</td>
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<tr>
<td>World Bank</td>
<td>$13.5</td>
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<td>USAID</td>
<td>$6.9</td>
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<tr>
<td>DFID</td>
<td>$3.7</td>
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<tr>
<td>DANIDA &amp; SIDA</td>
<td>$1.9</td>
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<tr>
<td>Asian Development Bank</td>
<td>$0.5</td>
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<tr>
<td>Interest</td>
<td>$1.2</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$66.5</strong></td>
</tr>
</tbody>
</table>

### Donors

Voracious demand for information on progress, accountability, and recognition

- PAC meetings (two per year)
- Annual donor reports
- Medium Term Plan revised annually
- *Ad hoc* requests for information
- Periodic external reviews
- Media, public recognition
Conclusions

- Interdisciplinary dialogue and communication gets easier over time, buy-in for a common long-term vision becomes more solid
  - Considerable investment needs to be made up front in meetings to get off to a good start
- Scientists and implementers will cooperate (some non-cooperators need to be replaced over time)

Conclusions

- A major disadvantage of crop breeding is that it takes 15 years from initiation of planning activities to realization of widespread adoption, especially where development of new methodologies and capacity building is involved
- Sustaining donor interest over such a long period is a major challenge
In Conclusion …

“Such intimately related subjects as agriculture, food, nutrition and health have become split up into innumerable rigid and self-contained little units, each in the hands of some group of specialists. The experts, as their studies become concentrated on smaller and smaller fragments, soon find themselves … learning more and more about less and less. Everywhere knowledge increases at the expense of understanding …”

In Conclusion

“The remedy is to look at the whole field covered by crop production, animal husbandry, food, nutrition, and health as one related subject and then to realize the great principle that the birthright of every crop, every animal, and every human being is health.”
The Soil and Health, 1945

Sir Albert Howard,
1873-1947