Never an Empty Bowl: Sustaining Food Security in Asia

Asia Society and International Rice Research Institute Task Force Report

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Hong Kong’s rice bowl

- 7 million bowls of rice each day
- H$ 4 million each day spent on rice
- It takes 290 ha of land each day to grow that rice
- It takes 4 billion liters each day to grow that rice
Number of people below the $1.25 per day (PPP) poverty line who live in areas dominated by different crops (2005 data). Numbers are based on areas more than 10% covered by the dominant crop. Some areas have more than one dominant crop and thus overlap.
The Global Rice Equation

Million Tons (Paddy)  Billion People

1 billion people = 100 million tons more rice (paddy)

S. Mohanty, IRRI
Global Per Capita Rice Consumption

Kilograms

IRRI
2 kg

FAO IFPRI
7 kg 15 kg
Million tons milled rice

Additional rice needed: 116 million tons by 2035

2010 global rice production

Asia ▪ Africa ▪ Americas ▪ Rest of World
What needs to be done?

Rice demand:
- In each of the next 10 years produce at least 8 million tons rice more (rough rice).

Rice supply:
- Little change in harvested area (155-160 million ha)
- Yield growth of 1.2-1.5% until 2020 (+0.6 t/ha); more in Africa
- Yield growth of 1.0-1.2% after 2020

Change how we grow rice:
- New seeds to adapt to changing climate
- Less tillage, less water, less labor, less pesticides, more efficient fertilizer use
- More resilient, diversified rice-based farming systems

Smarter people who implement these changes
Raise system productivity, efficiency (land, water, labor) and resilience.

Sustainable systems with reduced environmental footprint.

Raise income.

Diversification becomes an option.

Investments in sustainable practices become attractive.

Improve food security, income, health, and nutrition.
Task Force Recommendations

1. Raise and sustain productivity of rice farmers while building resilience to climate change
   - Exploit the genetic diversity of rice
   - Rice breeding pipelines
   - Agronomic revolution – change how rice is grown
   - New high-yielding, diversified production systems
   - Improve postharvest technologies
   - New generation of rice scientists

2. Improve the environment for rural development (farm and non-farm activities)

3. Provide safety nets and more nutritious food to the rural and urban poor

4. Provide regional public goods for sustainable food security in Asia (Center for Coordination of Food Security Activities)
Financial Dimensions

- **UN**: additional $40 bln on top of the current $80 bln is needed for agricultural development to eliminate hunger and poverty in Asia by 2050

- **International rice R&D**: an annual investment of $120-130 million between 2010 to 2035 could
  - lift 130 million people in Asia out of poverty and 100 million out of hunger
  - spare 3 million ha land from being used for rice
  → $20 to lift one person out of poverty
A CGIAR Research Program (CRP) in Thematic Area 3: Sustainable crop productivity increase for global food security

Global Rice Science Partnership (GRiSP)

An evolving alliance of IRRI, AfricaRice & CIAT with Cirad, IRD, JIRCAS and hundreds of research and development partners worldwide

Each dot represents 5,000 ha of rice

Irrigated
Rainfed lowland
Rainfed upland
Over 900 R&D partners worldwide
Productivity and efficiency growth

**Improved varieties**
- Yield potential: inbreds and hybrids
- Vit. A & Zn
- New generation of stress-tol. varieties
- Varieties for conservation agriculture

**Improved rice systems**
- Ecological intensification & diversification of production systems
- New generation IPM

**Improved value chains**
- Grain quality & specialty rices

**Improved varieties**
- Yield potential: C4 rice
- Biotech (drought, heat, NUE, salinity)

**Improved rice systems**
- Ecological intensification & diversification of production systems

**Improved value chains**
- New products/by-products from rice

Africa

LAC

Asia

Target range 1.2 – 1.5%/yr

Do nothing

<1%/yr

Recent yield growth
Making rice climate-proof

- drought
- salinity
- submergence
- heat
October 1, 2010, Mymensingh district, Bangladesh

BRRI dhan51 (sub1)

Damaged & re-planted local rice field
Supercharging photosynthesis: C4 rice

A C4 rice should increase rice yield, water and nitrogen use efficiency by 30-50%.

No other evolutionary mechanism exists that could be added to a C3 rice so as to deliver that superior combination of benefits.

C3 + Anatomy Change + Biochem Change + Fine Tuning = C4

Massive international research effort needed for 20 years
## Future rice-based systems

<table>
<thead>
<tr>
<th>Tillage</th>
<th>Conventional</th>
<th>Reduced (Unpuddled)</th>
<th>Raised bed</th>
<th>Zero-tillage</th>
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<td><img src="image1" alt="Conventional Tillage" /></td>
<td><img src="image2" alt="Reduced Tillage" /></td>
<td><img src="image3" alt="Raised bed Tillage" /></td>
<td><img src="image4" alt="Zero-tillage Tillage" /></td>
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<th>Crop establishment</th>
<th>Transplant</th>
<th>Drum Seeding</th>
<th>Direct-drill-seeding</th>
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<tr>
<td><img src="image5" alt="Transplant" /></td>
<td><img src="image6" alt="Drum Seeding" /></td>
<td><img src="image7" alt="Direct-drill-seeding" /></td>
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</table>
A direct-seeded rice revolution in Asia?
Nutrient Manager provides farmers with field-specific guidelines.

- **Computer via Web connection**
  - www.irri.org/nmrice

- **Mobile phone**
  - SMS compatible

**Accessing NM Rice via Web**

1. Access web site
2. Answer 15 questions about field
3. Receive guideline via internet

**Accessing NM Rice via Mobile**

1. Call tool free number
2. Answer 12 questions about field
3. Receive guideline via text

**Guideline for NM Rice**

For 94-105 sacks of rice on 1 hectare in dry season w/ good management practices:
- Apply 3 bags 14-14-14 basal or w/in 10 days after transplanting (DAT), 1 bag urea at 21 to 25 DAT, 1 bag urea at 30 to 34 DAT.

**Available in the Philippines. Coming soon in Indonesia and other countries**
Rice grain:
• Starch (~94%)
• Protein (~5%)
• Lipids (~1%)

Change starch structure to:
• Reduce cooking time
• Lower glycemic index

Decrease by 4 min = 10,000 years less cooking time each day.
Some strategic initiatives in India

- Transform rice production and livelihoods in Eastern Indian states
  - Stress-tolerant varieties adapted to climate change
  - Conservation agriculture
- A new molecular rice breeding center for India and other SAARC countries
- Mobile phone applications for providing crop information and financial services to farmers
- Attracting young people to work in science and agricultural extension
The IRRI Fund

Can a Grain of Rice Change the World?

For almost half a century, we've proven that it can.

Never an empty bowl

US$300 million fund-raising campaign launched for rice food security in Asia

The Green Revolution is generally believed to have saved one billion lives over six decades, making it arguably the single-most-effective philanthropic initiative in human history.


http://irrifund.org