The Nature and Role of Agricultural Innovation

Cultivating Innovation: Response to the Food Crisis
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It was not just a blip - there is a long term trend

- Driving the longer term trends
  - Rising populations
  - Rising per capita incomes
  - Growing demand for livestock products
  - Growing demand for biofuels
  - Increasing water and land scarcity
  - Impact of climate change
  - Slowing of productivity increases
Why can’t Developing Countries Respond?

- Lack of inputs
- High costs of fertilisers
- Inappropriate technologies
- Poor land tenure
- Lack of water
- Poor extension
- Variable and unreliable markets
- etc

- This is why we need innovation
Innovation is

The process by which new products, processes or techniques are produced

It may involve new ideas, new technologies, or novel applications of existing technologies or new institutions, or more generally, new ways of doing things in a place or by people where they have not been used before.

Modern innovation is usually stimulated by innovation systems and involves teams.
Assessing Innovation

- Is the new technology or process effective in meeting the desired ends?
- Is it value for money?
- Is it equitable and sustainable?
- What are the downsides?
- What is the counterfactual?
Are Past Successes a guide?

The Green Revolution was one of the most successful technologies of the 21st century.
Based on a relatively simple innovation

- New short-strawed wheat and rice varieties
- Given adequate controlled water
- That soaked up nitrogen to give high yields
- In well regulated environments
- By most progressive farmers
The Limitations

- Focused on ‘ideal’ environments
- Over-reliance on synthetic pesticides and fertilisers
- Not all the poor benefited
- Passed Africa by
Thus today there are:

• Over 800 million chronically undernourished

• 180 million children severely underweight for their age

• 400 million women of child bearing age anemic

• Over 200 million children vitamin A deficient
Average Cereal Yields

(FAO 2006)
The Way Forward
Doubly Green Revolution

• The aim
  • repeat the success of the Green Revolution
  • on a global scale
  • in many diverse localities

• and be
  • equitable
  • resilient
  • and environmentally friendly
What kind of Innovations?

Productivity

Resilience

Equitability

Stability

Sustainable Agriculture
We need Innovative Technologies

- Traditional Technologies
- Intermediate Technologies
- Conventional Technologies
- Advanced Technologies
Traditional Technologies
A Javanese Home Garden
Wollo Province
Ethiopia
1986
Treadle Pump
Controlling Striga using Desmodium
Conventional Technologies
Quality Protein Maize

opaque     yellow     white
kernel     vitreous   QPM
Marker- Aided Selection

- Locating and tagging the genes for drought tolerance
Advanced & Platform Technologies

• Information & Communication Technologies
• Biotechnology
• Nanotechnology
• New Materials
The New Rices for Africa

Monty Jones

2004
African X Asian Rices

Oryza sativa

Progeny

Oryza glaberrima
Increase of 12%, 12.3 million hectares (30 million acres), between 2006 and 2007.

Source: Clive James, 2007.
Uganda
Diamond Back Moth

Source: CIMBAA
But technology innovation is not by itself enough. It has to be disseminated.
Soaking Seeds

- Soak seeds before sowing
- Better germination
- 30% higher yields
- Better pest and weed control
- Can add nutrients to water
But this is already fermenting, this is the brew the government is fighting. Let's go to the chief.

WHAT ARE THE BENEFITS OF SEED SOAKING?

Covering seeds will improve moisture uptake, more completely and soon more strongly than non-soaked seeds. That means that there will be fewer gaps, the crop will compete better against weeds and will give higher yields.

WHAT ARE THE KEY STEPS TO TAKE WHEN SEED SOAKING?

Cover the seeds in double the amount of water, press down. The seed does not need to be pressed and surface-dry the seeds for about an hour before soaking.

Chief: This is what I have heard about seed soaking.

Mashreddy: We are very sorry.

It's advisable to plant the seeds the same day after soaking. But if you can't, surface-dry seeds then store them for several days.

WHAT ARE POTENTIAL WAYS IT COULD GO WRONG?

Soaked seeds become subtly softer – be gentle with them. If you cannot sow straight away, make sure the soaked seeds are surface-dry and keep in a dry, well-ventilated place so that they don't rot.

Organisations that could help:

Dave Harris from Banjor University
Email: dave@banjor.ac.uk
Dr Kipto Kim Kariuki
P.O. Box 362, Thika
You can also visit your nearest agricultural officer.
But technology innovation is not by itself enough. Farmers also need market innovation.
Input Markets
Agrodealers
Output Markets
Cereal Bank in Western Kenya
For Exports

Innovations in Quality Control
Rwanda

Bourbon Coffee
Processing &
Quality Control
The Nature of Innovation
A Personal View
A Global Science and Technology Innovation System for the 21st Century

Translational Research

Basic Sciences
Universities
Advanced labs

Product Development & Use
National & Private Labs
Entrepreneurs

POLICIES
INSTITUTIONS
TEAMS
NETWORKS
Adaptation measures in Ningxia

- Drought:
  - Farmer level
    - Plastic film
    - Change to plant other crops
    - Cover small stone
    - Terrace
    - Saving water irrigation
    - Water cellar
    - ......
Building National Innovation Systems

Need to develop:

- Coherent science, technology and innovation policies
- An educated workforce
- Innovative enterprises & entrepreneurs
- Education, Vocational Training, and R&D Institutes.
The Poor are also Innovators

• ‘The unique decision making processes associated with agriculture, especially smallholder agriculture, can stimulate broader growth by fostering the processes of learning and innovation.’

• Timmer, 1988
Farmers as Analysts
Innovative and Resilient Livelihoods