In Search of an African Green Revolution

Center for Global Development
Washington, DC
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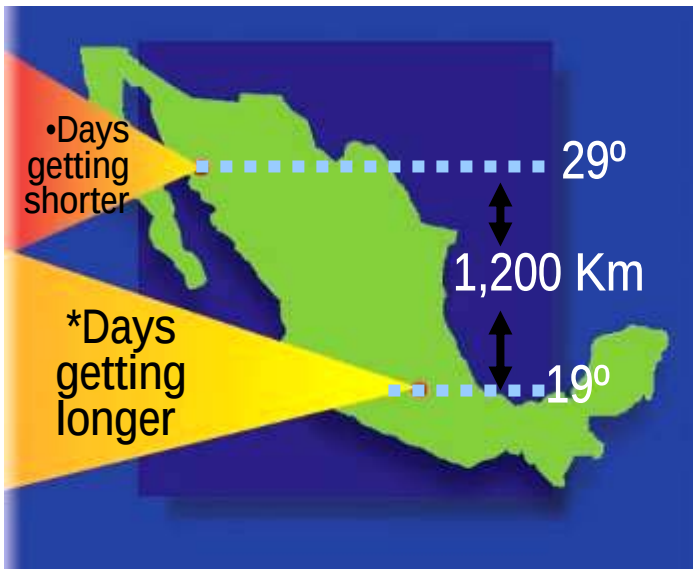
President
Sasakawa Africa Association

Mexican Government-Rockefeller Foundation

Cooperative Agricultural Program 1943-1960

- Multidisciplinary research focus to increase yields and production
- Train a multidisciplinary corps of young Mexican scientists
- Get research results to farmers as soon as possible
- RF staff to work themselves “out of a job”

Shuttle Breeding and Multi-location International Testing Produced the Broadly Adapted Mexican Wheat that Triggered the Green Revolution



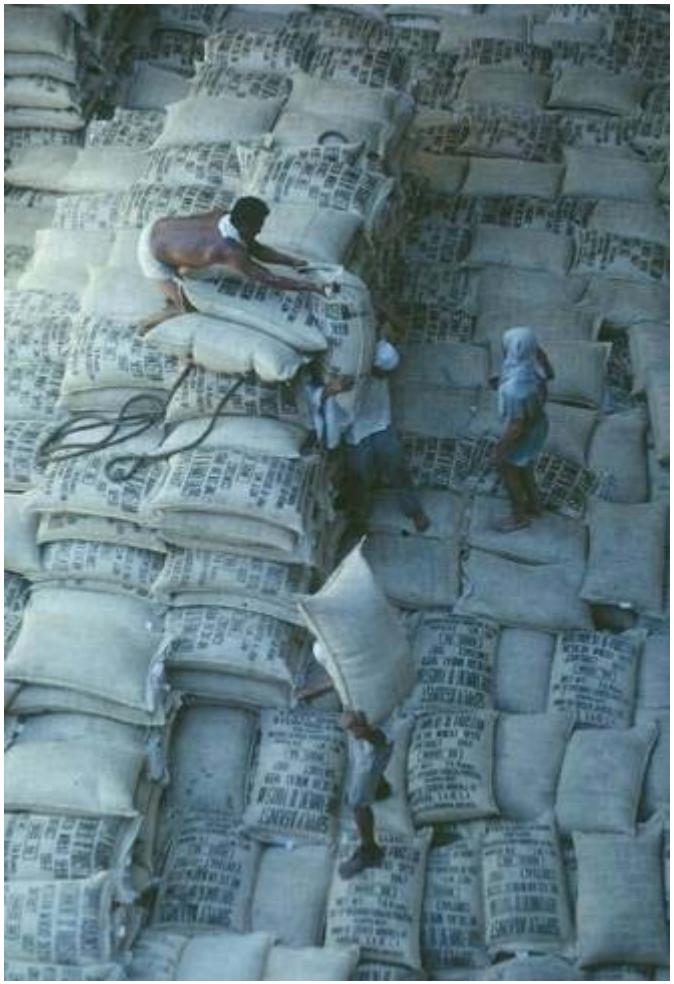
* Initial period after sowing

FAO/Rockefeller/Mexican Government Training Program

- Started in late 1960
- Young scientists from North Africa, Near- and Middle-East
- In-service training in all the disciplines
- Trainees took HYV semidwarf seed technology back home
- International multi-location yield nurseries

Hunger and Famine Stalks Asia

- By 1965 huge food deficits in India—10 million tons of cereals being imported, and rising
- Irrigated areas seriously under performing: low rice and whet yields.
- Geopolitics—LBJ pressuring Indira Gandhi on Non-Aligned Movement Vietnam policy
- Leaders over-ruled local scientists and moved aggressively to introduce high-yield wheat and rice technology in 1965-66



Mexican Wheat Seed Shipments to Asia

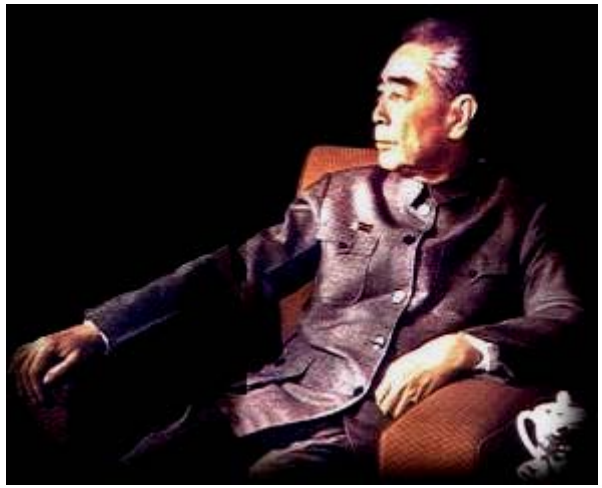
1965: 250 tons to Pakistan;
200 tons to India
1966: 18,000 tons to India
1967: 42,000 tons to Pakistan;
21,000 tons to Turkey
1968: Pakistan sends 5,000 tons to China

Profiles in Courage

Chinese Leadership

Profiles in Courage

Deng-Xiaoping
Paramount Leader
1978-89



Chou En-Lai
Prime Minister
1949-76

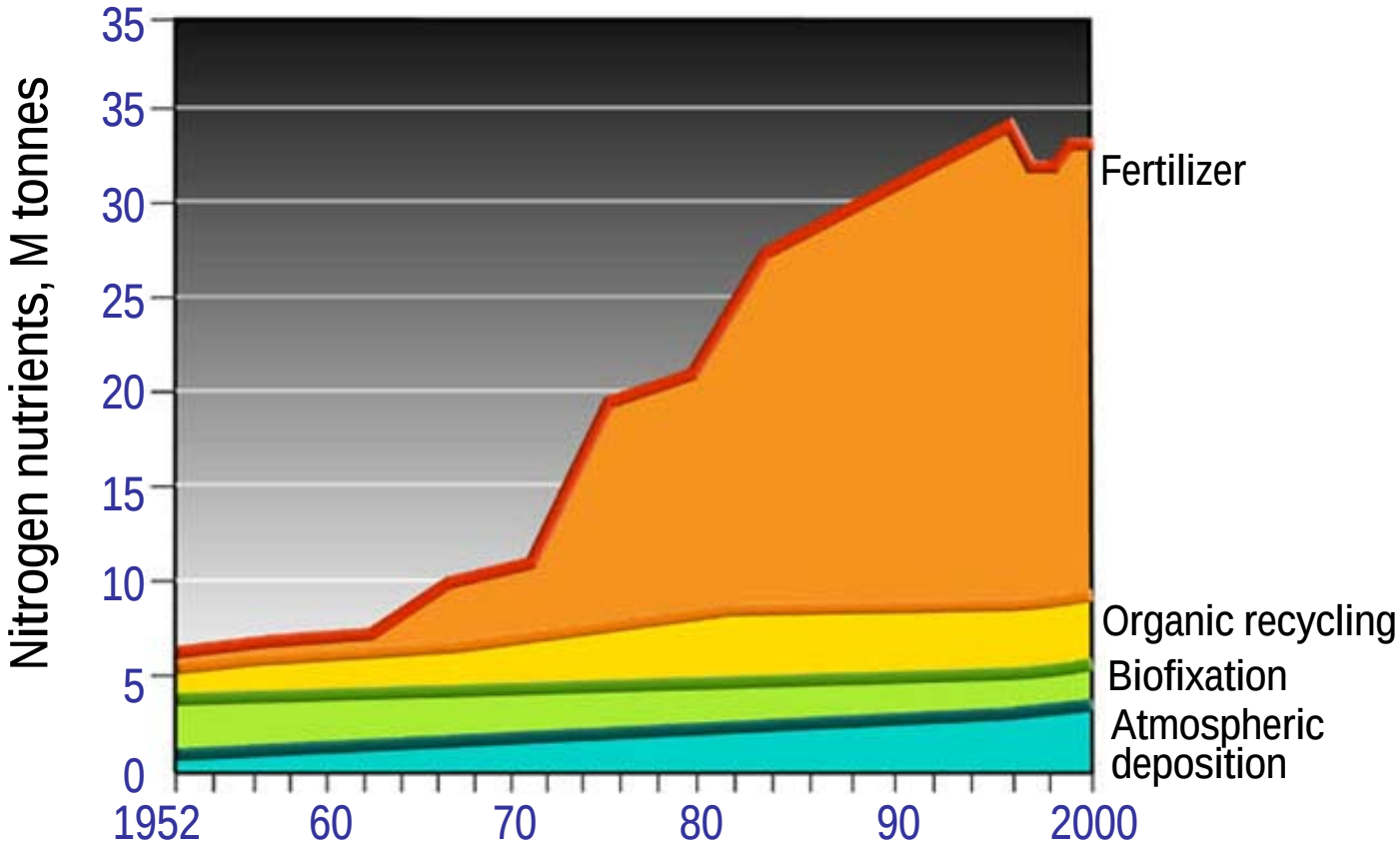
He Kang
Minister of Agriculture
1978-90

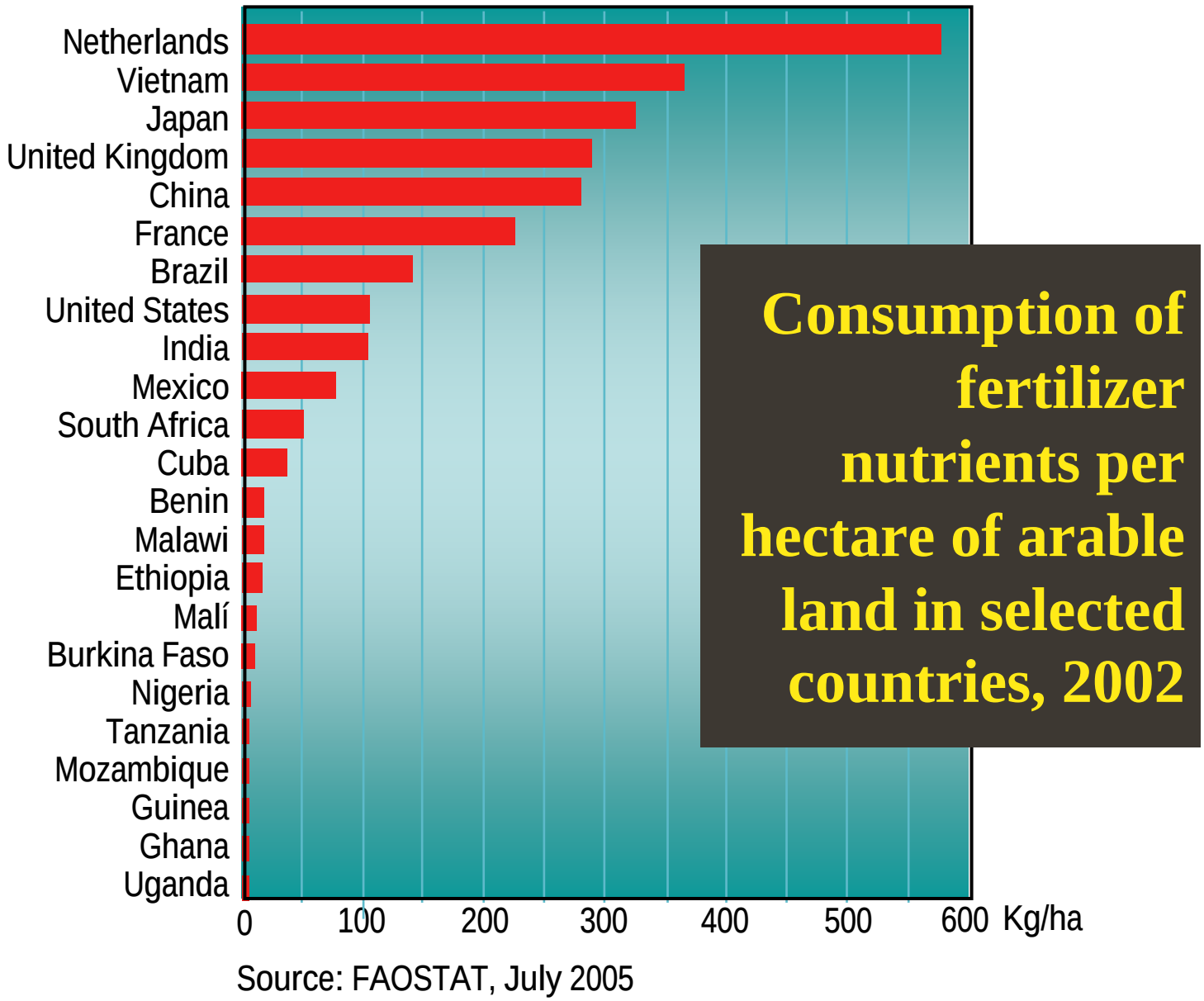
Green Revolution:
Changes in Factors of Production in Developing Countries of Asia

	Adoption of Modern varieties					
	Wheat	Rice	Irrigation	Fertilizer Nutrient Use	Tractors	Cereal Production
	M ha / % area		million ha	million t	millions	million t
1965	0 / 0%	0 / 0%	94	5	0.3	368
1970	14 / 20%	15 / 20%	106	10	0.5	463
1980	39 / 49%	55 / 43%	129	29	2.0	618
1990	60 / 70%	85 / 65%	158	54	3.4	858
2000	70 / 84%	100 / 74%	175	70	4.8	962
2005	72 / 87%	102 / 76%	178	77	6.4	1,017

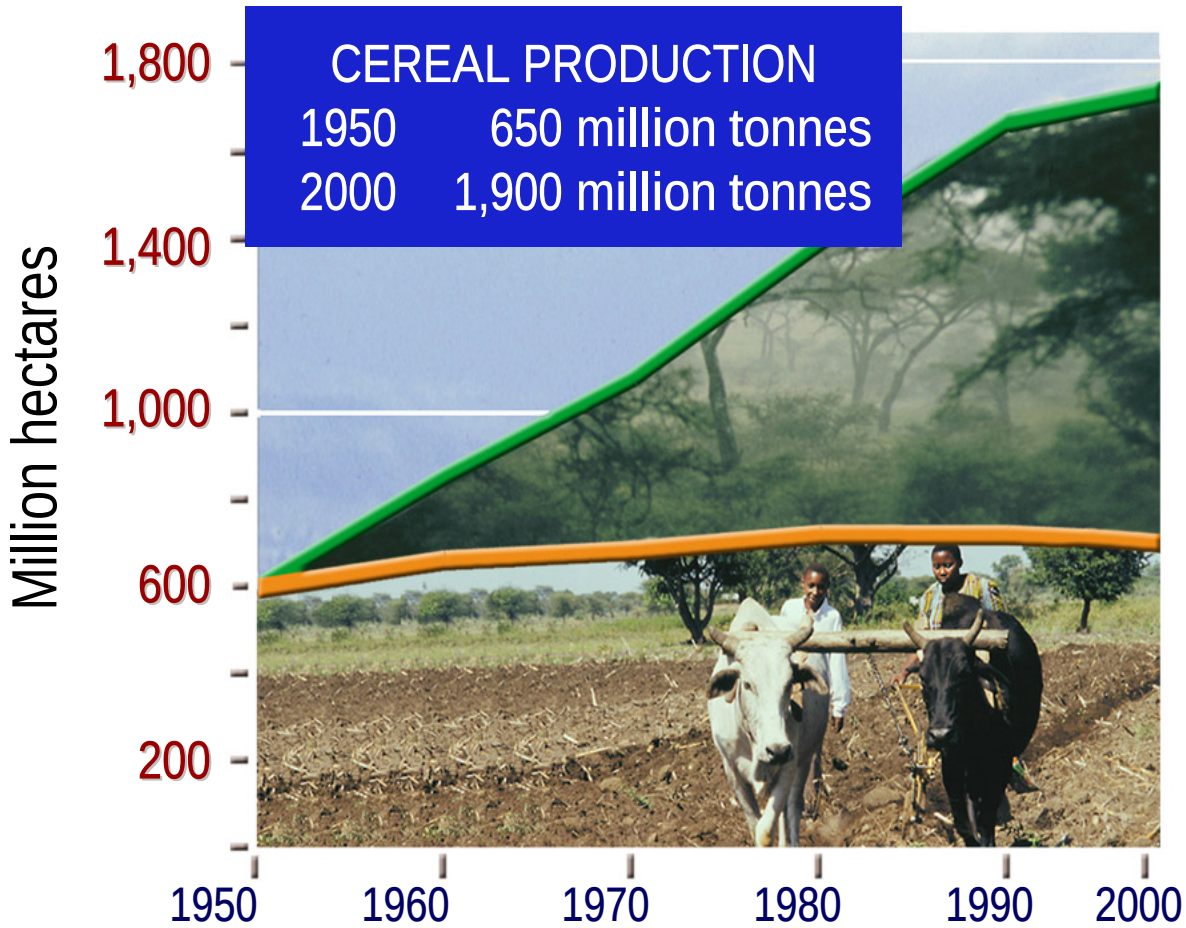
Source: FAOSTAT, March 2006 and author's estimated on modern variety adoption, based on CIMMYT and IRRI data.

Nitrogen Inputs Into China's Cropping, 1952-2000




Netherlands
Vietnam
Japan
United Kingdom
China
France
Brazil
United States
India
Mexico
South Africa
Cuba
Benin
Malawi
Ethiopia
Malí
Burkina Faso
Nigeria
Tanzania
Mozambique
Guinea
Ghana
Uganda
0
100
200
300
400
500
600
Kg/ha
Consumption of fertilizer nutrients per hectare of arable land in selected countries, 2002
Source: FAOSTAT, July 2005

World Cereal* Production–Areas Saved Through Improved Technology, 1950-2000



LAND SPARED 1.1 billion ha

LAND USED 660 million ha

* Uses milled rice equivalents

Source: FAO Production Yearbooks and AGROSTAT

Comparing Green Revolution Asia with Sub-Saharan Africa

ASIA

- Irrigated agriculture
- Good transport infrastructure
- Public input supply and grain marketing boards
- Many production subsidies
- Large unmet commercial market demand

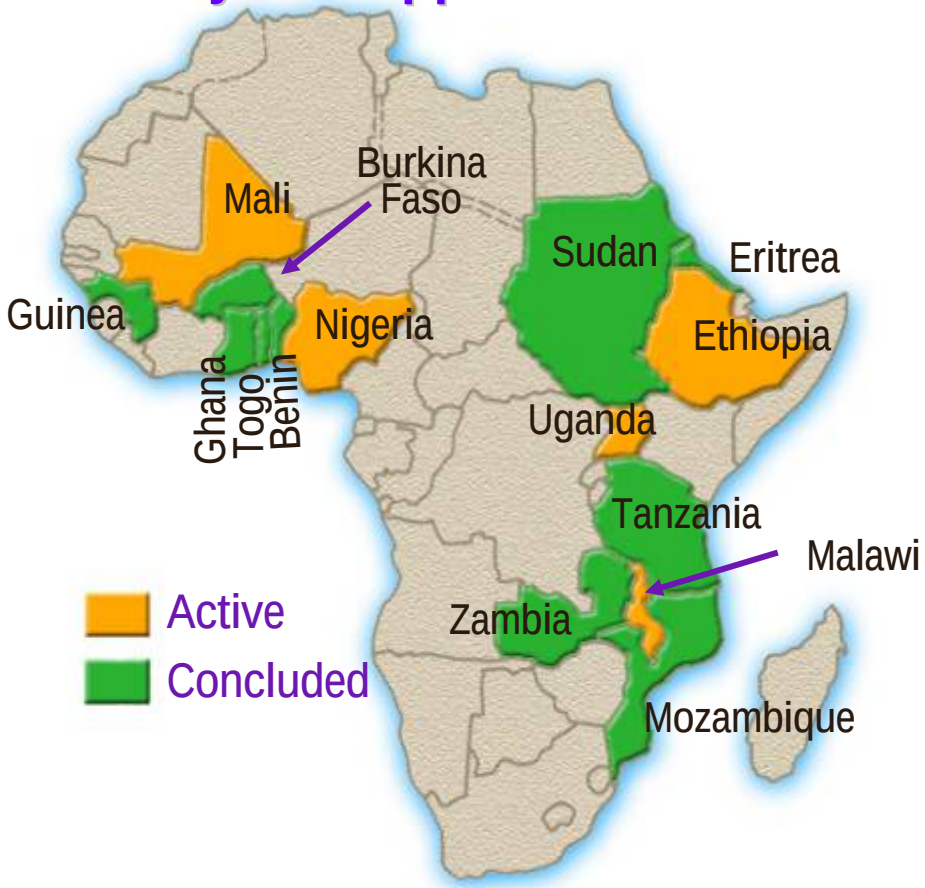
AFRICA

- Rainfed agriculture
- Poor transport infrastructure
- Market-driven input supply and grain marketing systems
- Few production subsidies
- Small unmet commercial market demand

Sasakawa-Global 2000

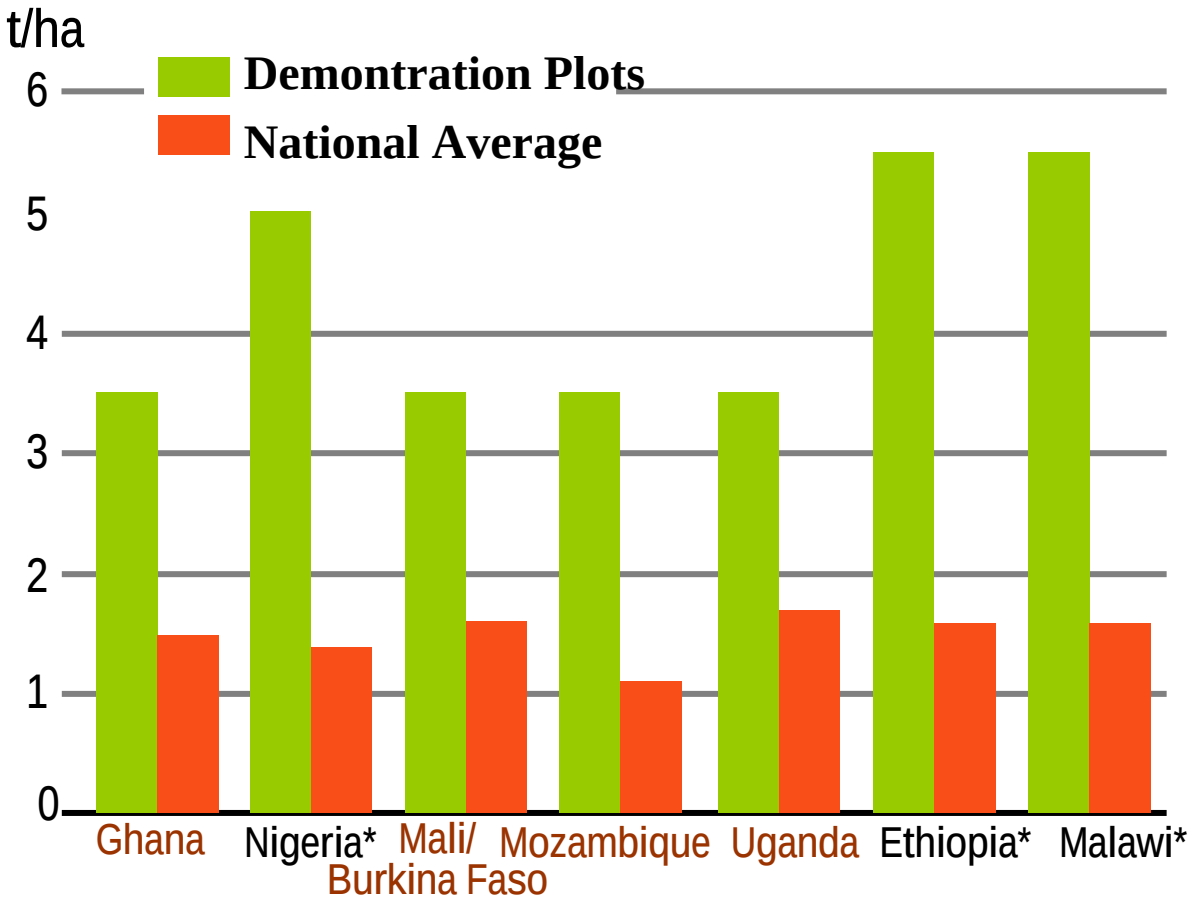
Reaching Africa's Small-scale Farmers with Improved Technology

Funded by the Nippon Foundation of Japan



Started in 1986

Sasakawa-Global 2000
Maize Demonstration Yields



*** Primarily using hybrids**

Quality Protein Maize (QPM)

A Non-GMO Forerunner

- Opaque-2 gene—Purdue University discovery (1963)
  - high lysine
  - high tryptophan
- CIMMYT Conversion from soft to hard grain at CIMMYT (1970-78)
- Need to manage the opaque-2 gene in seed production

Diversify Smallholder Agriculture



Improve basic foods



Include cash crops



Integrate livestock



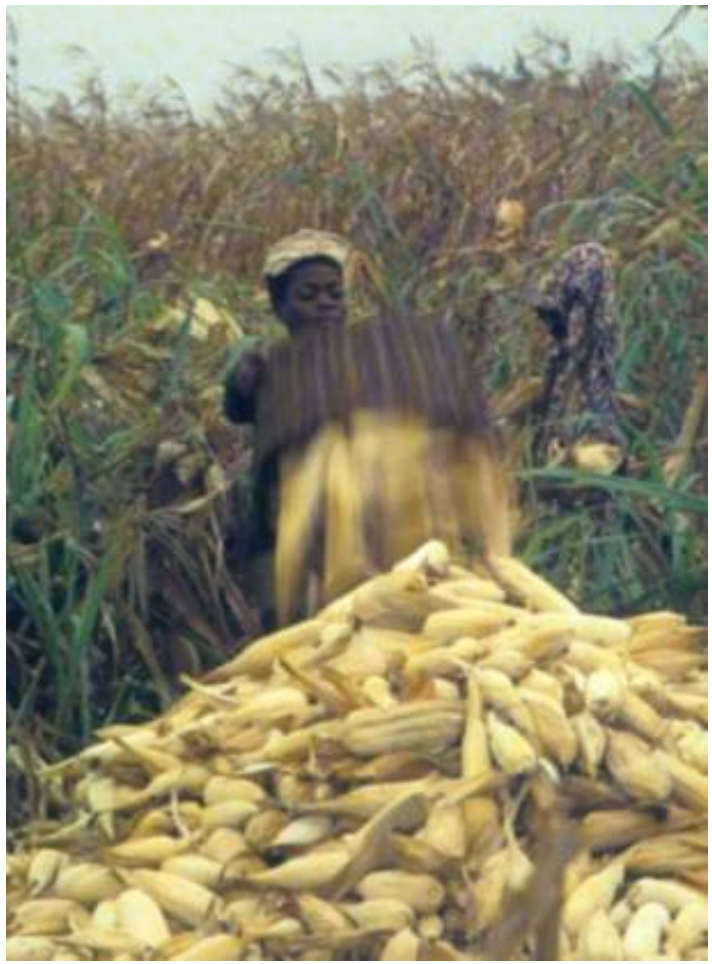
Add agro-proccessing

Improving Input Delivery Systems

Seed

Fertilizer

For Adoption, Fertilizer-Grain Price Ratios Must Provide Sufficient Profit



WATER RESOURCE DEVELOPMENT

- **Africa has the potential to irrigate 20% of its arable land**
- **Only 4% is currently irrigated**
- **Small-scale systems generally are the most cost- effective**

Lack of Infrastructure Is Killing Africa

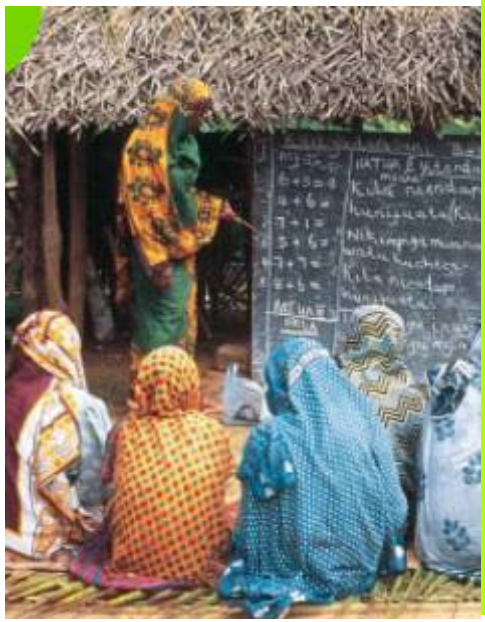
Kilometers of paved roads per million people in selected countries

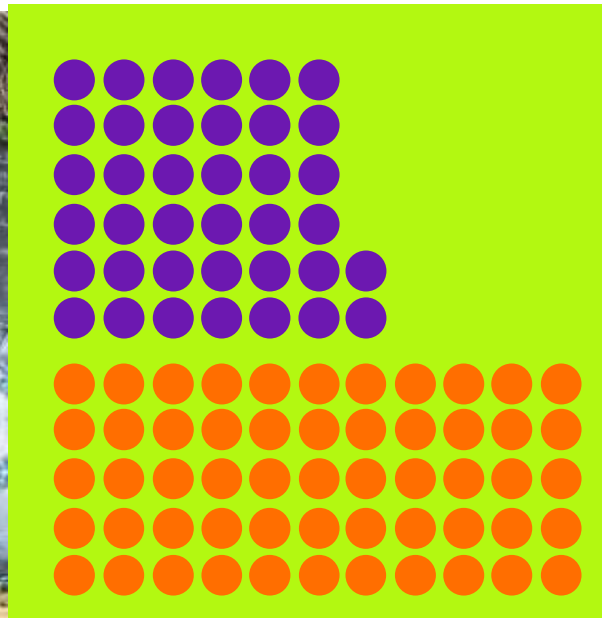
	Km		Km
USA	20,987	Guinea	637
France	12,673	Ghana	494
Japan	9,102	Nigeria	230
Zimbabwe	1,586	Mozambique	141
South Africa	1,402	Tanzania	114
Brazil	1,064	Uganda	94
India	1,004	Ethiopia	66
China	803	Congo, DR	59

Source: Encyclopedia Britannica, 2003

“Marshall Plan” for Africa

AFRICAN ADULT ILLITERACY





Male
55 million

Female
91 million

TOTAL = 146 million people (40% of all adults)

+ 45 million primary school age children not in school

GMOs for 21st Century

Insect and Disease Resistance

Herbicide Resistance

Nutritional Quality

Abiotic Stresses

Genetic Yield Potential

Bt Cotton

- 9 million ha worldwide;

  6 million small farmers
- Excellent control of boll worm
- Major reduction in insecticide use
- Substantial reduction in poisoning of farmers
- Significant increase in farmer profits

2005
Global GMO Crop Coverage

Area	Million ha
USA	49.8
Argentina	17.1
Brazil	9.4
Canada	5.8
China	4.3
Paraguay	1.8
India	1.3
South Africa	0.5
13 other countries	1.0

Crops	Million ha
GM Soybean	54.4
GM Maize	21.2
GM Cotton	9.8
GM Canola	4.6

Total: 90 million ha (222 million acres)

Source: ISAAA, 2006

Agriculture and Peace

- Only 8% of countries with the lowest levels of hunger are mired in conflict
- 56% of countries with highest levels of hunger have civil conflict
- World military budgets in 2006 exceed US$ 1 trillion annually (USA accounts for 55% of total)
- International donor support to agriculture still exceptionally low

“You Cannot Build Peace on Empty Stomachs.”

John Boyd Orr
Nobel Peace Laureate
First FAO Director General