



THE CONTRIBUTION OF POTATOES TO GLOBAL FOOD SECURITY

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Potato Europe 2010



CENTRO INTERNACIONAL DE LA PAPA



CIP'S mission



.....to achieve food security, well-being and gender equity for poor people in root and tuber farming and food systems in the developing world.

We do this through research and innovation in science, technology and capacity strengthening.



1. Cali (Colombia)
 2. Quito (Ecuador)
 3. Lima (Peru)
 4. Huancayo (Peru)
 5. San Ramon (Peru)
 6. Cochabamba (Bolivia)
 7. Sao Carlos (Brazil)
-
8. Kumasi (Ghana)
 9. Cotonou (Benin)
 10. Huambo (Angola)
 11. Addis Ababa (Ethiopia)
 12. Nairobi (Kenya)
 13. Kabale (Uganda)
 14. Ruhengeri (Rwanda)
 15. Lilongwe (Malawi)
 16. Blantyre (Malawi)
 17. Chimioio (Manica Province, Mozambique)
-
18. Tashkent (Uzbekistan)
 19. New Delhi (India)
 20. Shillong (India)
 21. Kathmandu (Nepal)
 22. Dhaka (Bangladesh)
 23. Bhubaneswar (India)
 24. Beijing (China)
 25. Hanoi (Vietnam)
 26. Lembang (Indonesia)
 27. Los Banos (Philippines)
 28. Manokwari (Papua Indonesia)
 29. Wamena (Papua Indonesia)
 30. Honar Honiara (Solomon Islands)



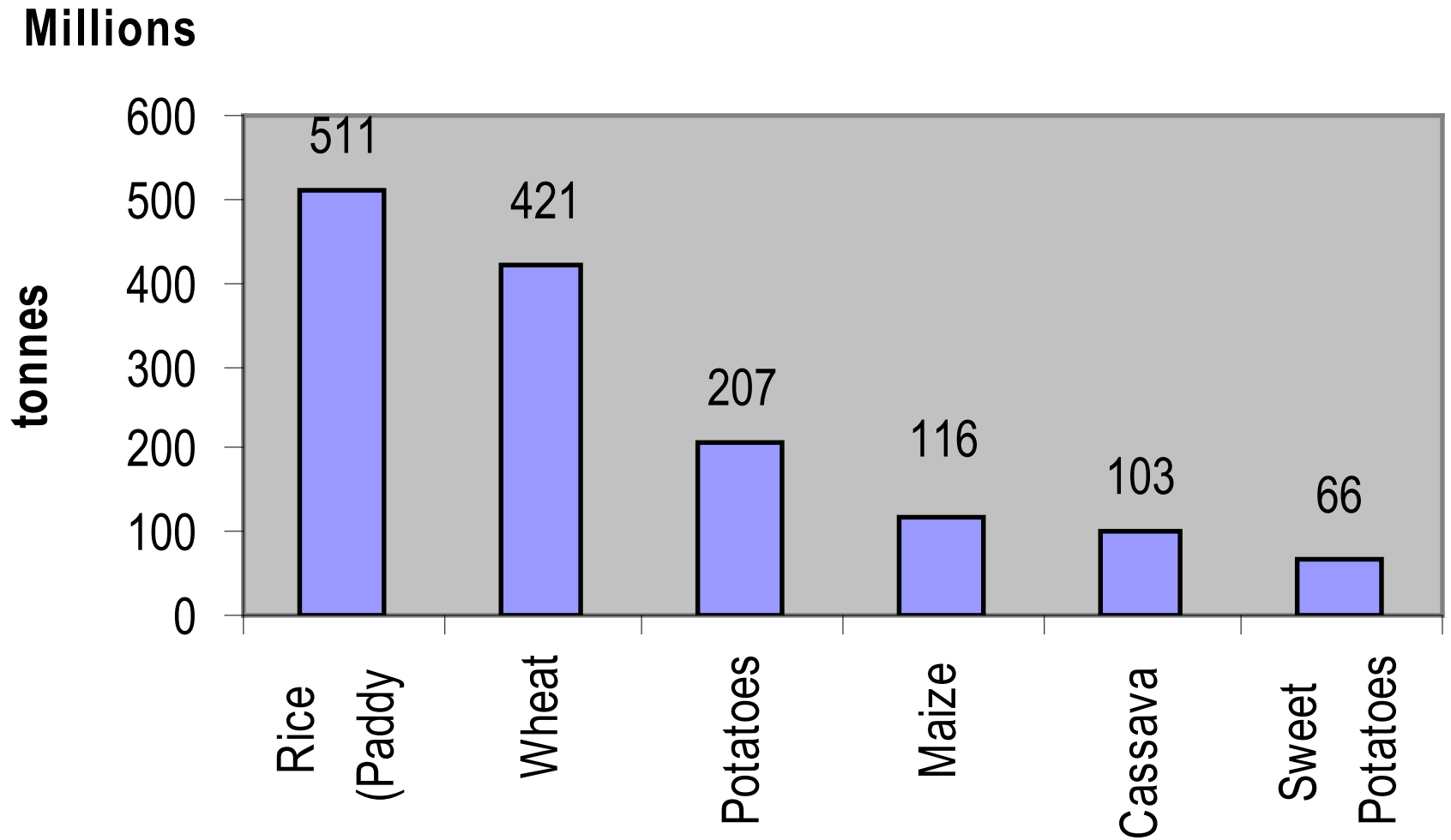
The CIP Vision
 Roots and tubers improving
 the lives of the poor



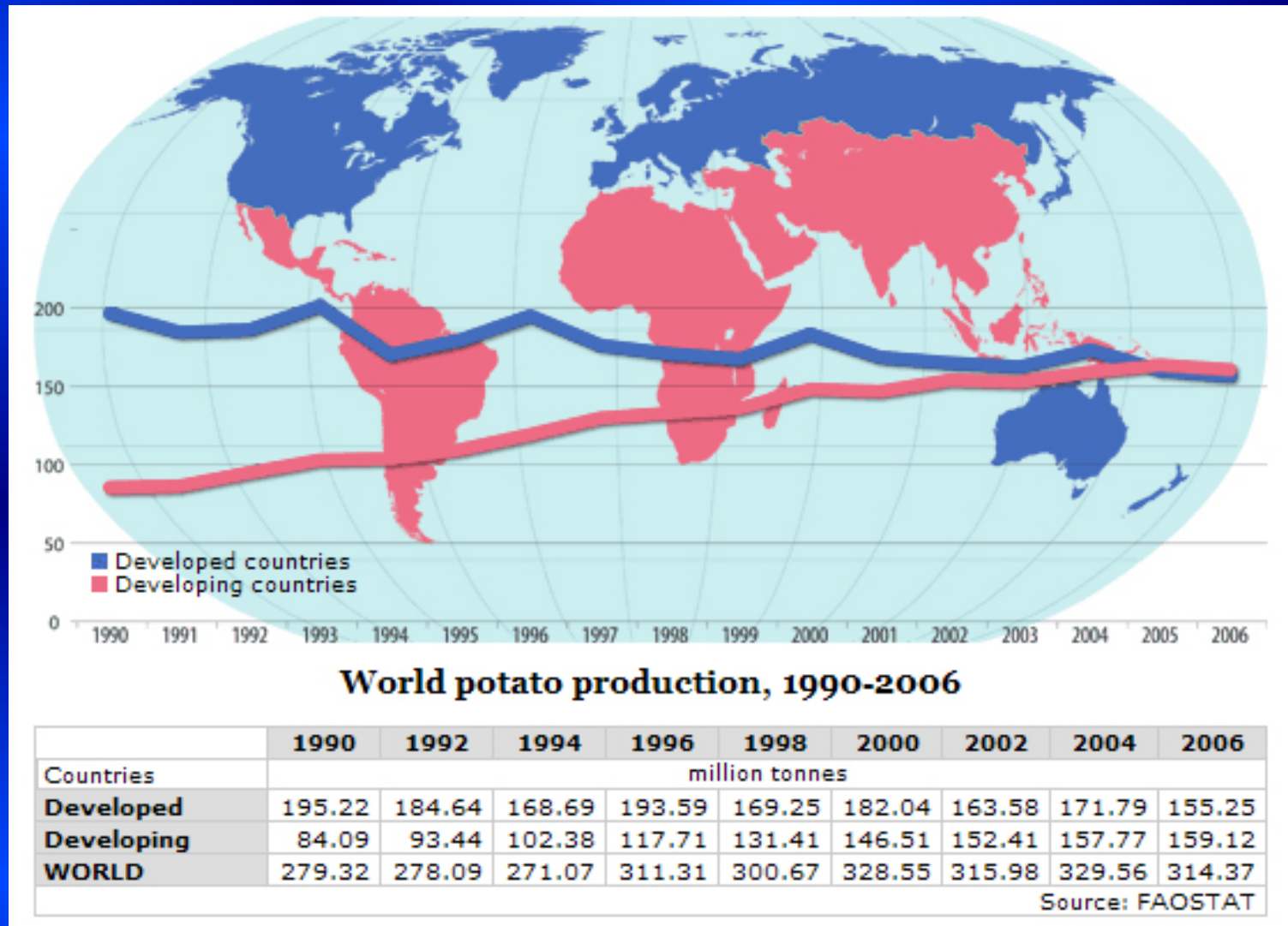
The spread of the potato around the world from Peru



FOOD CONSUMPTION

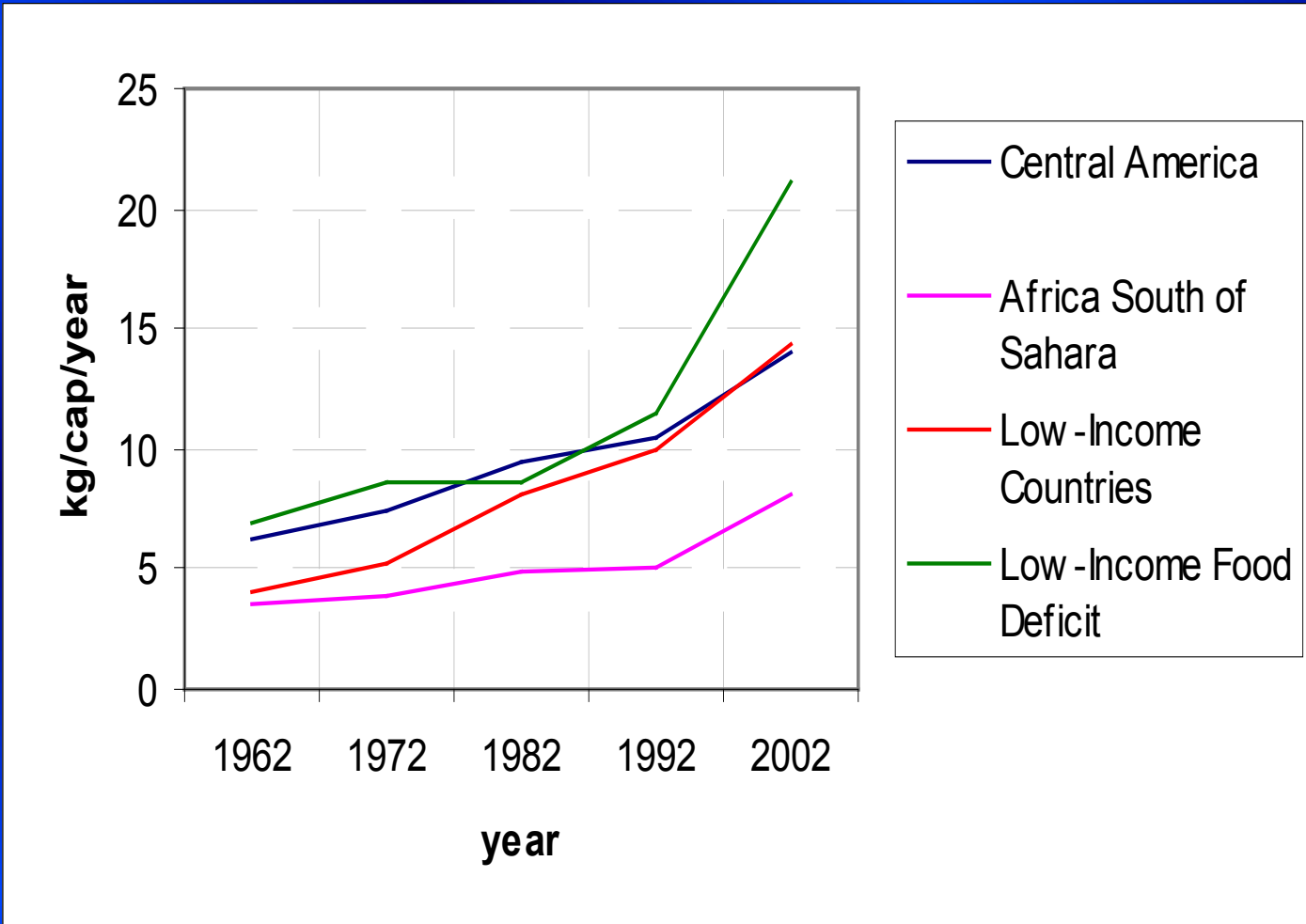


Potato production shift



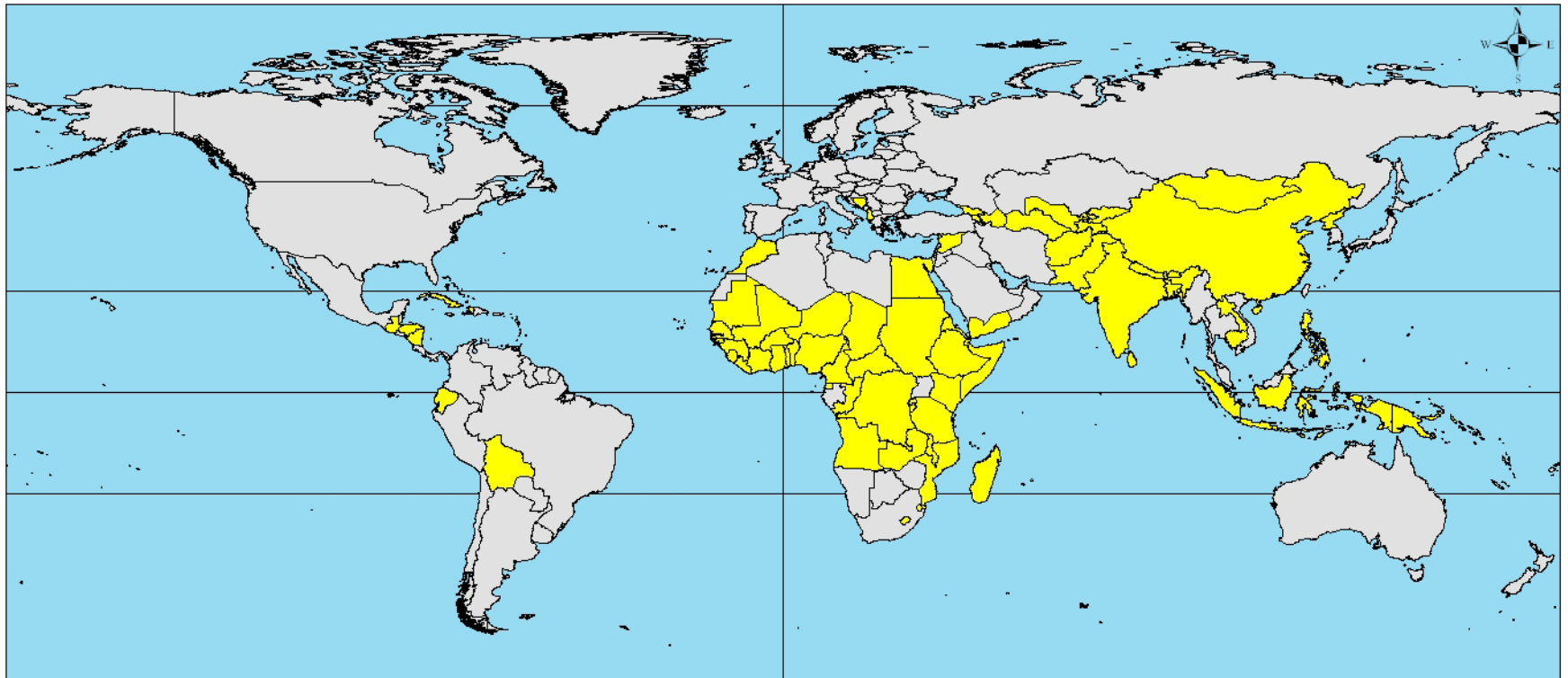
Source: FAOSTAT

Regional trends in potato consumption



Source: FAOSTAT

Low-Income Food-Deficit Countries (LIFDCs)



GLOBAL TRENDS

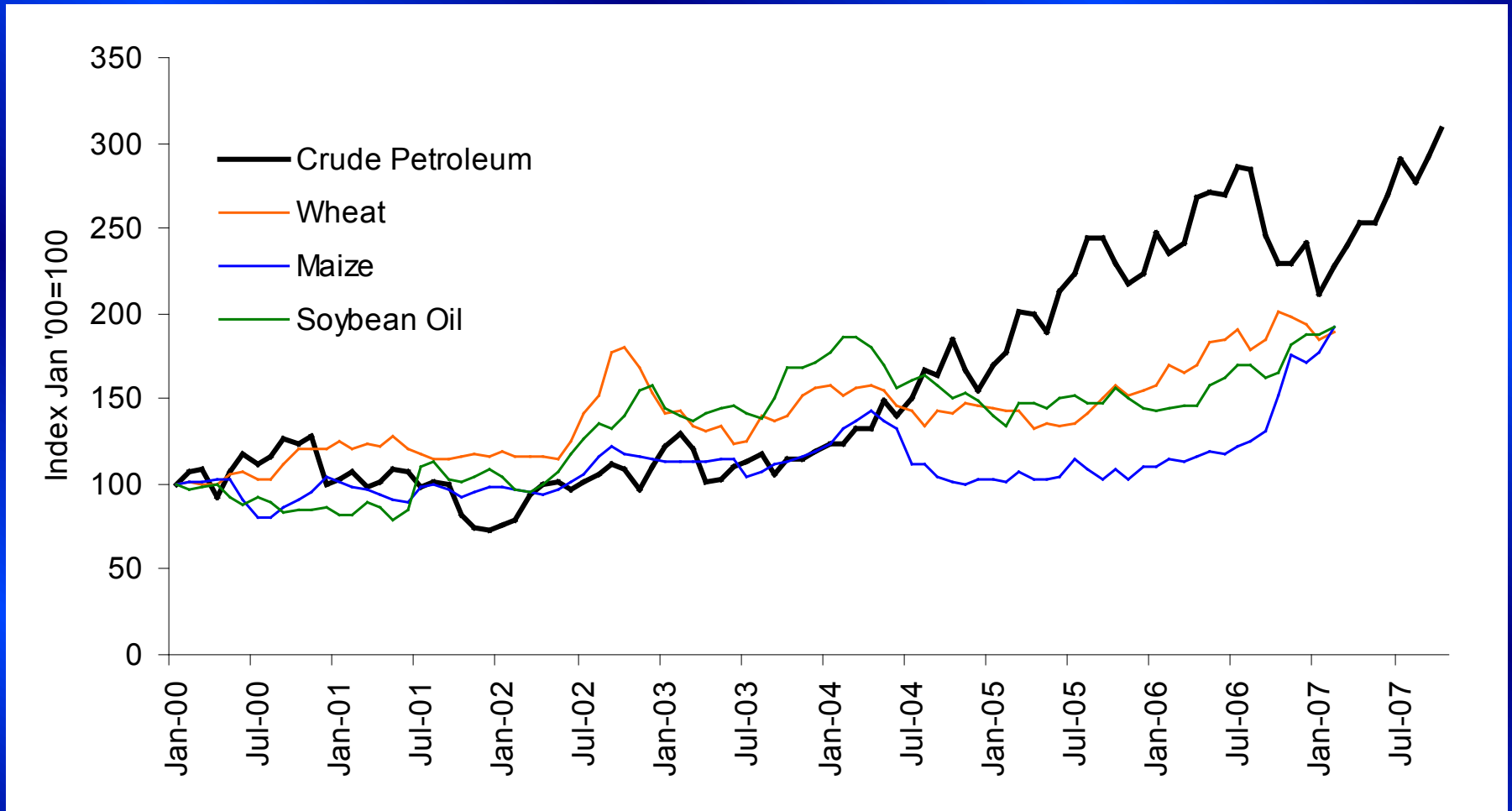
**POTATO CONSUMPTION AND
PRODUCTION HAVE BEEN
INCREASING ACROSS THE
DEVELOPING WORLD**

Drivers of Growth in Potato Production

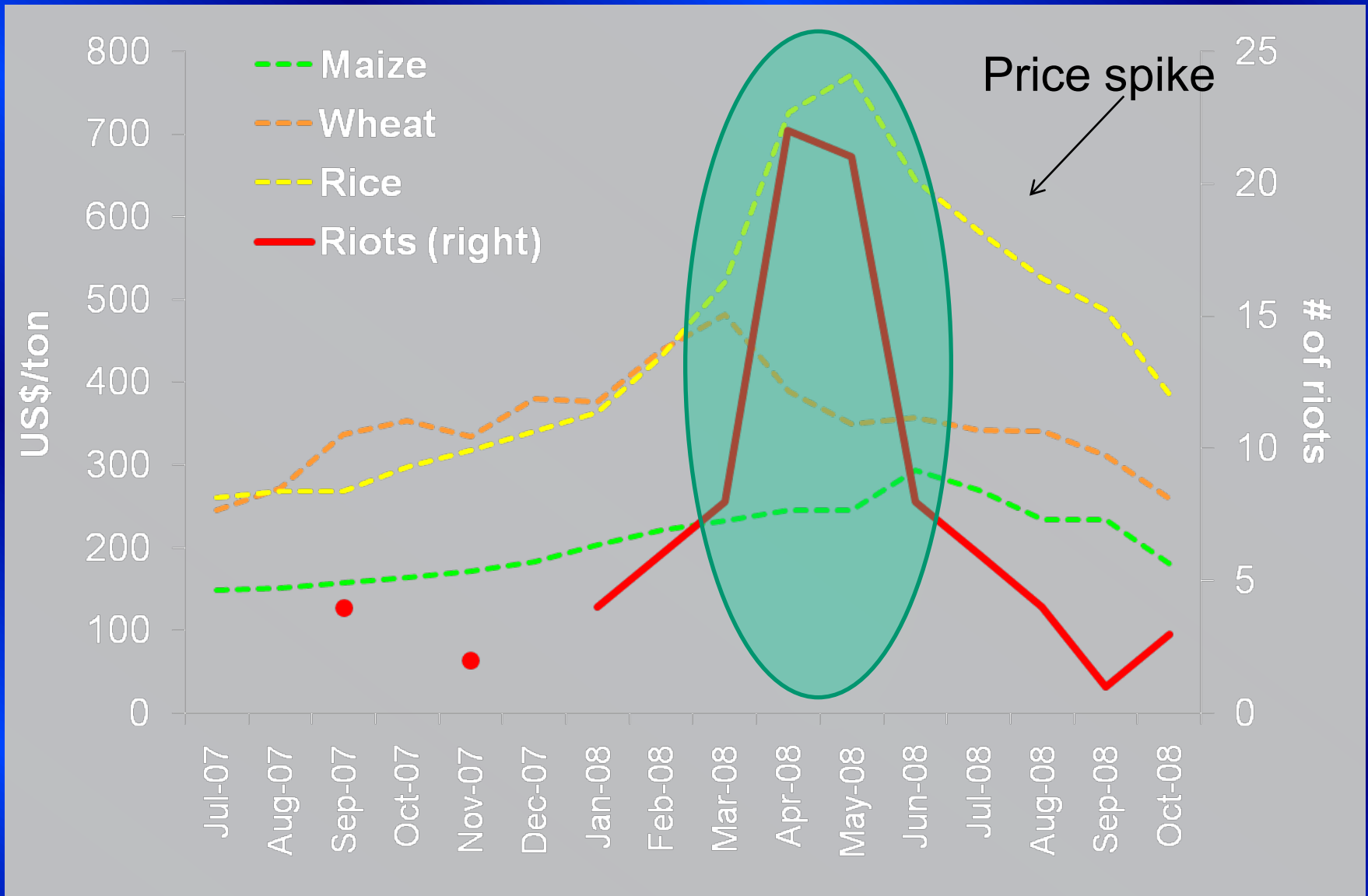
Potatoes are

Cheap and Nutritious

Between 2000 and 2008 wheat, maize, and rice prices increased dramatically



Food riots a mass phenomenon when prices spike



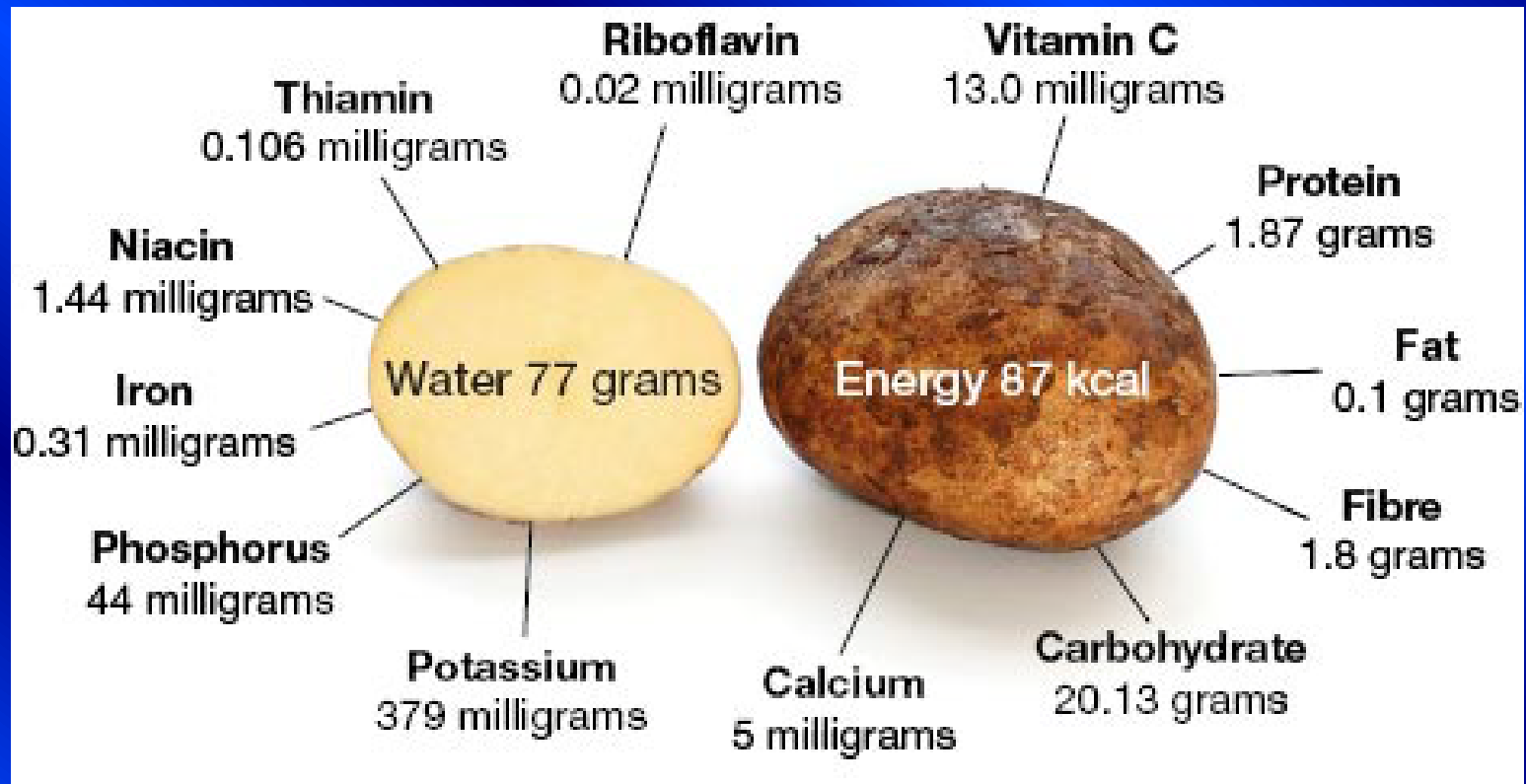
Drivers of Growth in Potato Production

May 2008 – FAO study

Potato – the antidote to high food prices

While grain prices were skyrocketing, potato prices around the world were stable

Nutritional Security – Nutrient Content of Potatoes



(Per 100 g, after boiling in skin and peeling before consumption)

Source: United States Department of Agriculture, National Nutrient Database

Drivers of Growth in Potato Production

Potatoes are

Multi-purpose

Income Generators

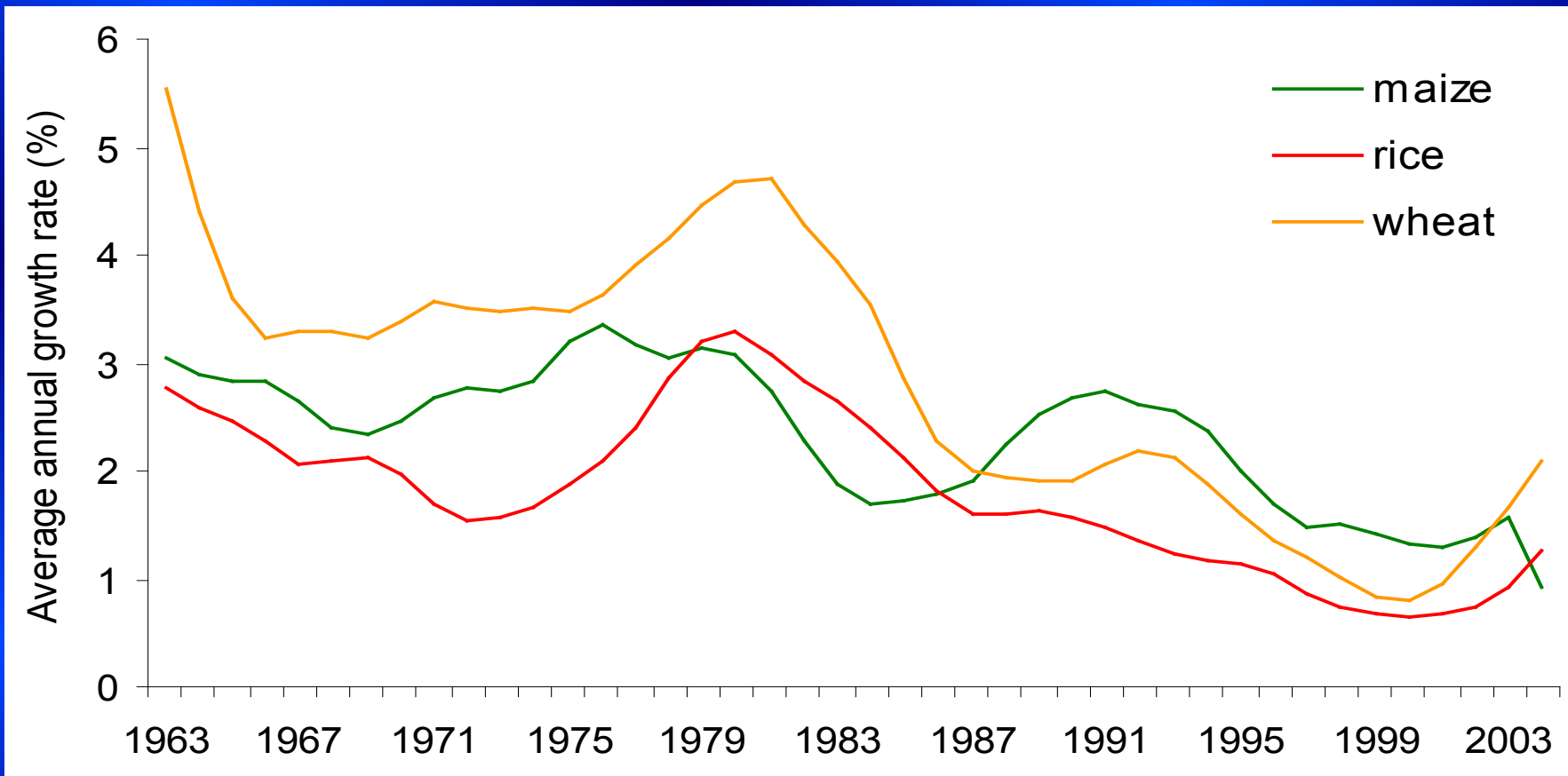




Drivers of Growth in Potato Production

**Growth rates
for the roots and tubers
(including potatoes)
are by far out-performing
the major grain crops**

Growth rates of yields for major cereals in developing countries are slowing



Source: World Bank, 2007. World Development Report 2008: Agriculture for development.

GROWTH RATES OF ROOTS & TUBERS (1993 – 2020)

Yam 2.9%

Potato 2.7%

Cassava 1.9%

Sweetpotato 1.0%

Drivers of Growth in Potato Production

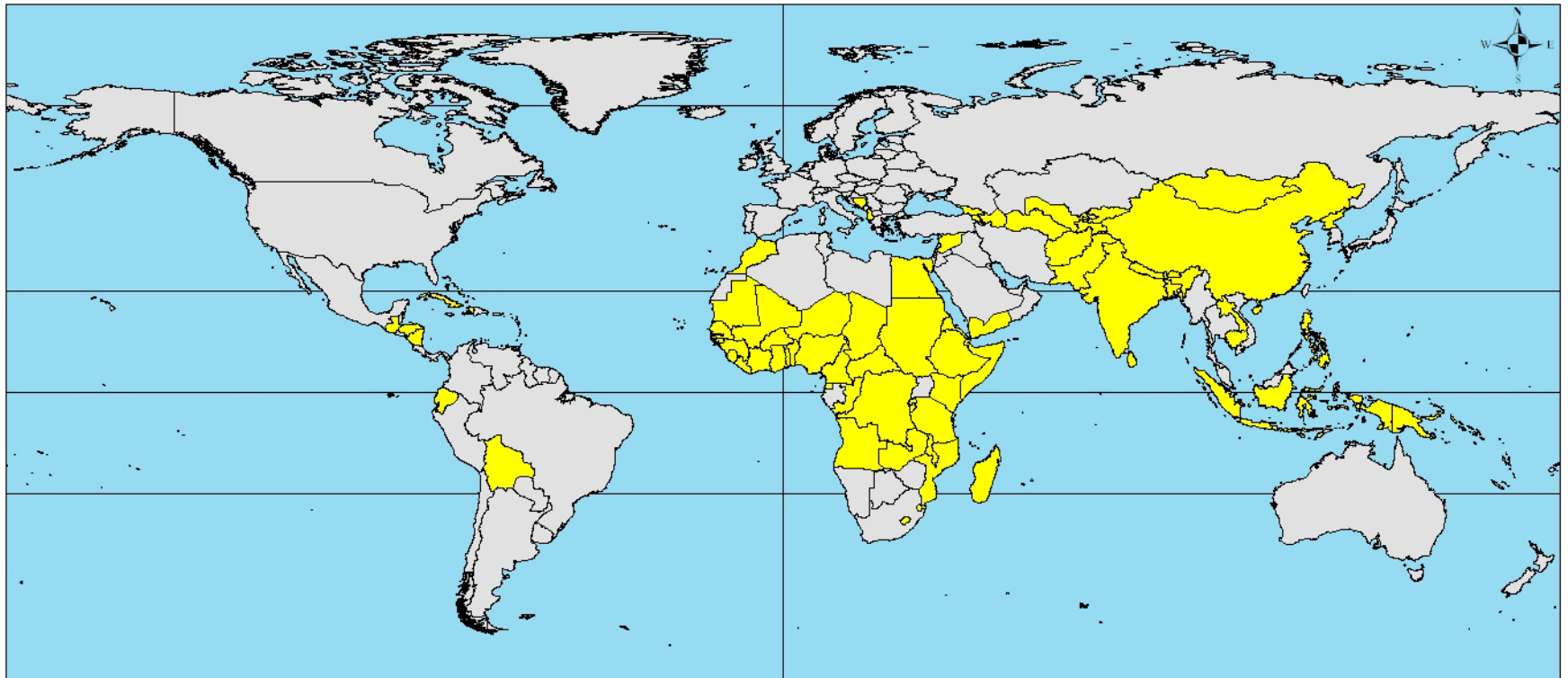
Potatoes are efficient

**Potatoes produce more energy
per unit land and time
than any other major staple crop**

Production of edible energy

	MJ/ ha / day
Potato	216
Yam	182
Maize	159
Sweetpotato	152
Rice	121
Cassava	121

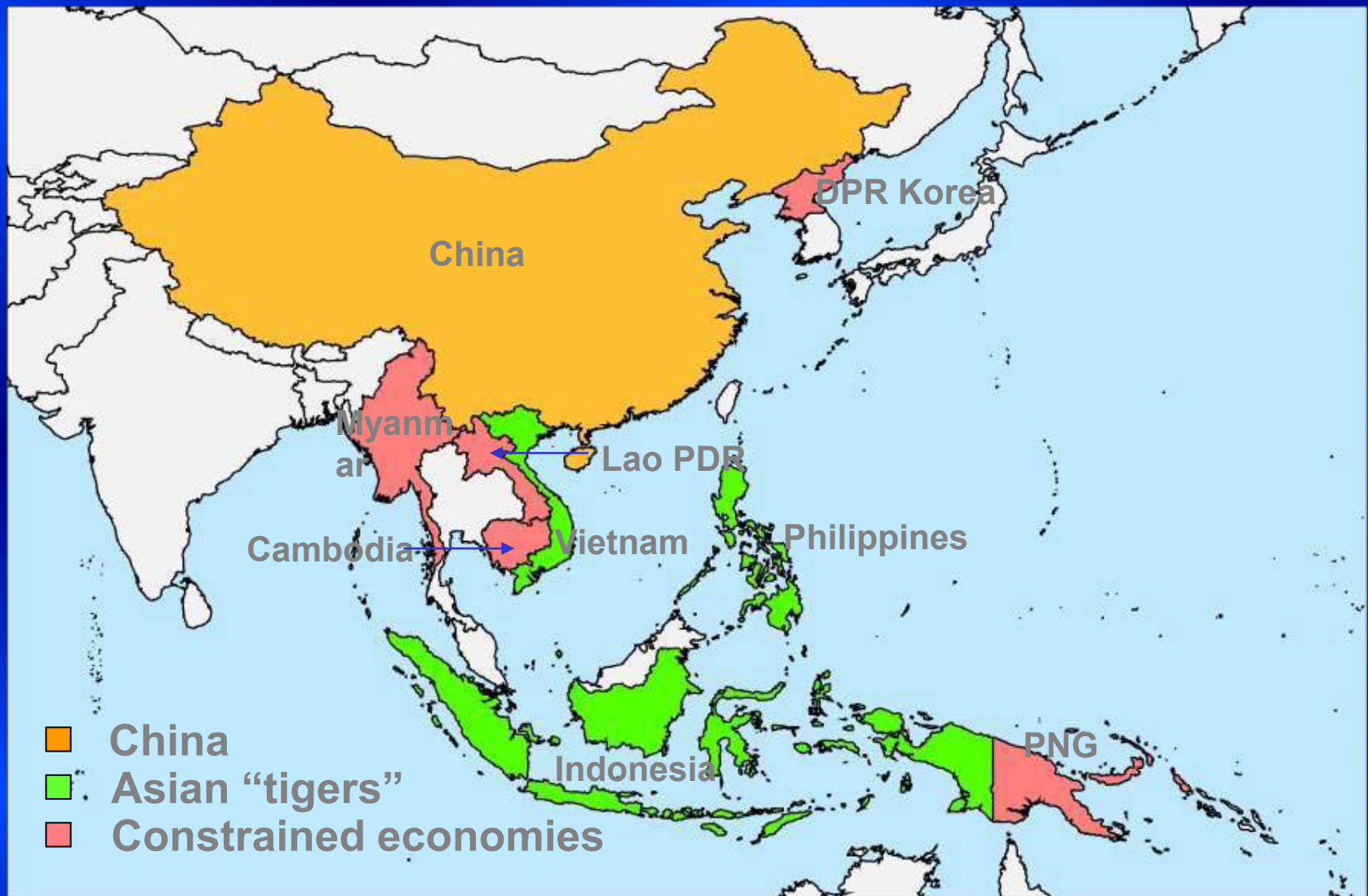
Low-Income Food-Deficit Countries (LIFDCs)

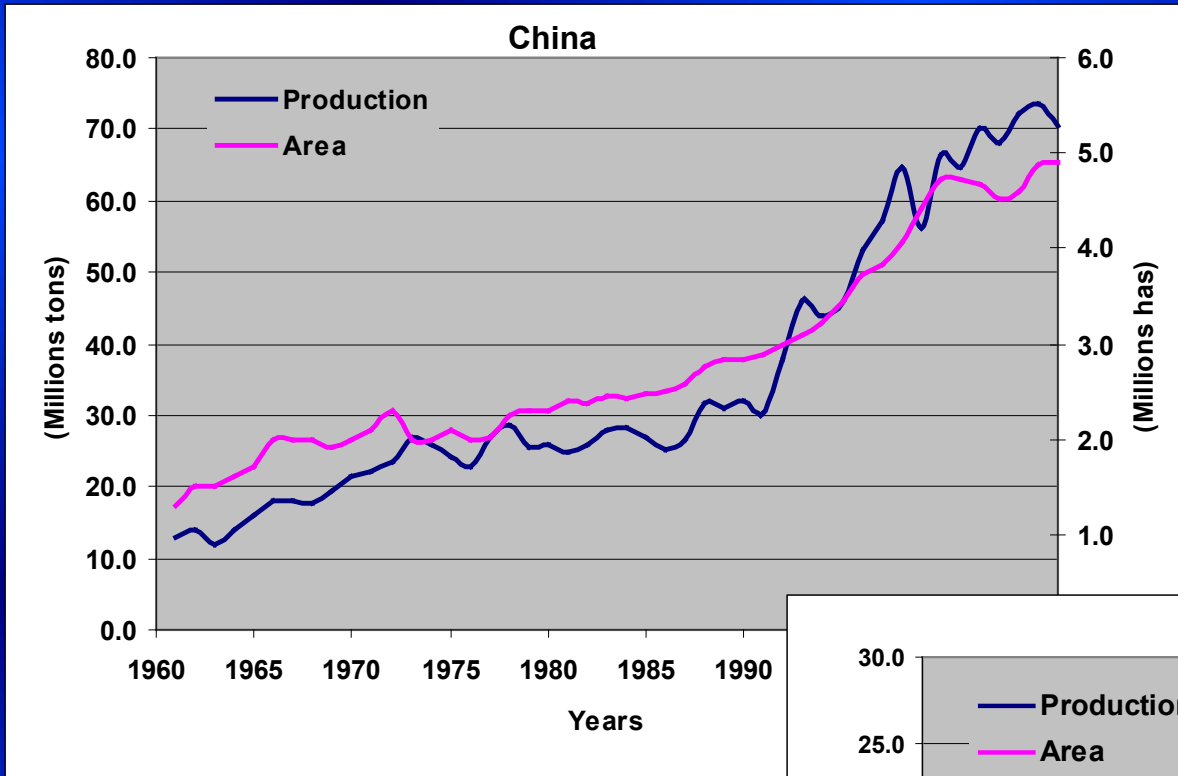


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**Asia - Increasing
productivity**

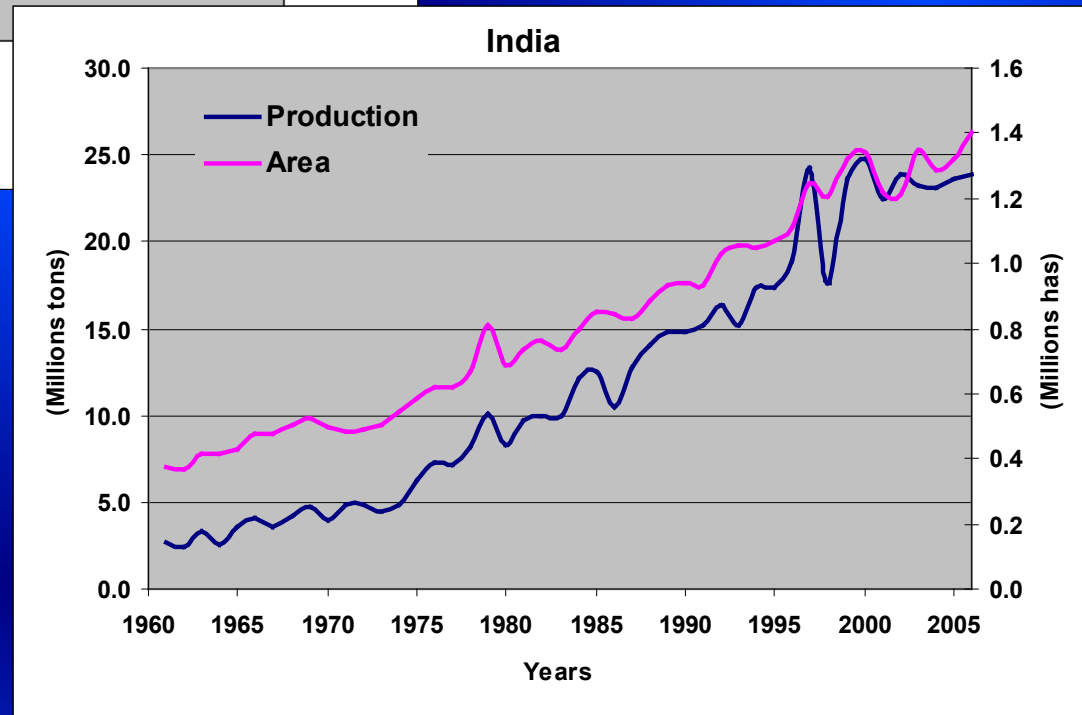
Food Security is a critical challenge in Asia





Production and Area Growth: India and China

A half century of expansion

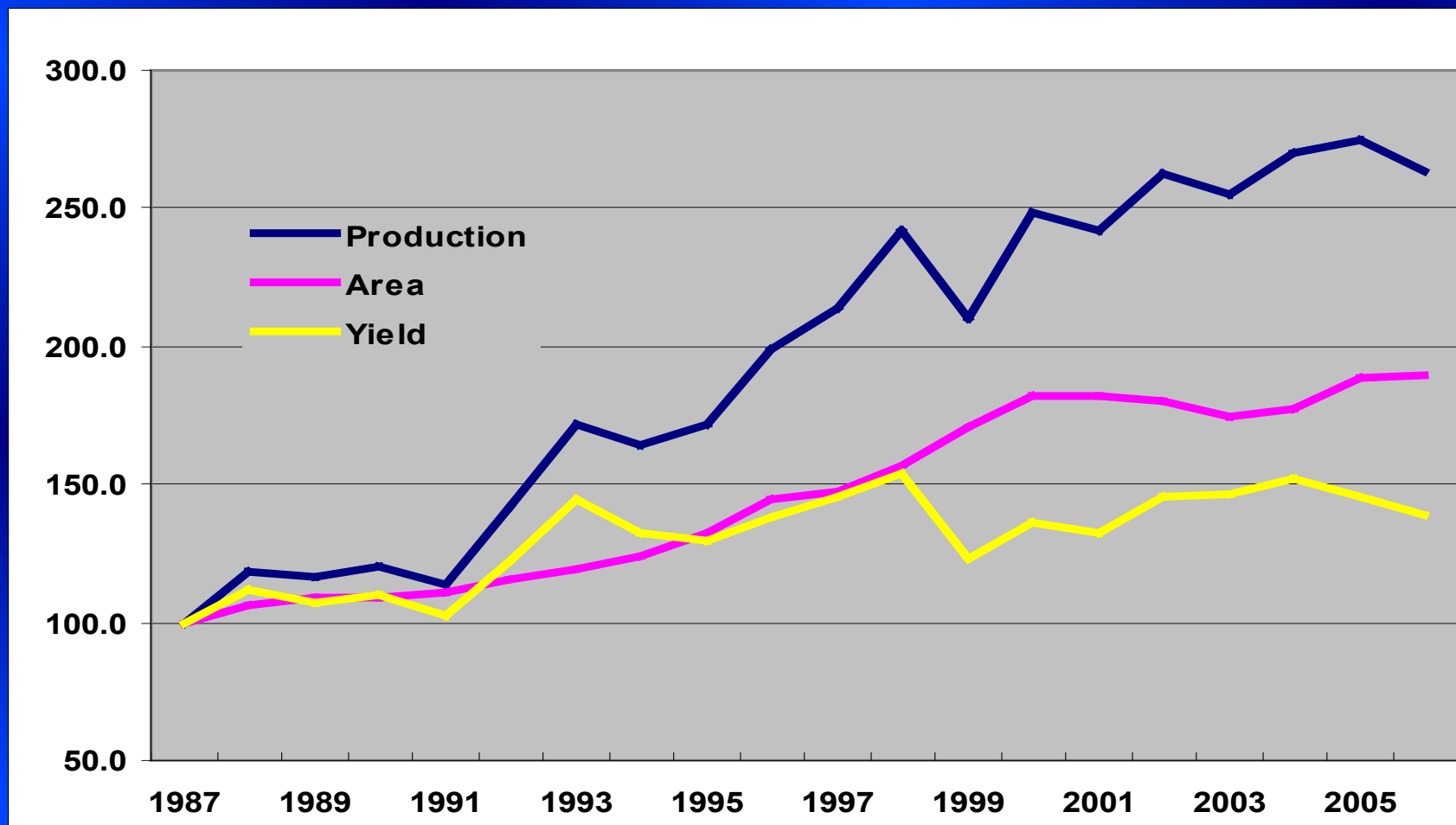


THE CHINA CHALLENGE – FOOD SECURITY

The Chinese population is expected to continue growing and stabilize at about 1.5 billion.

They have targeted 95% food self-sufficiency, which means that over the next 2 decades food production will need to increase by 100,000,000 T/year, and that 50,000,000 T/year could come from potatoes alone

Index of production, area and yield in China



2006

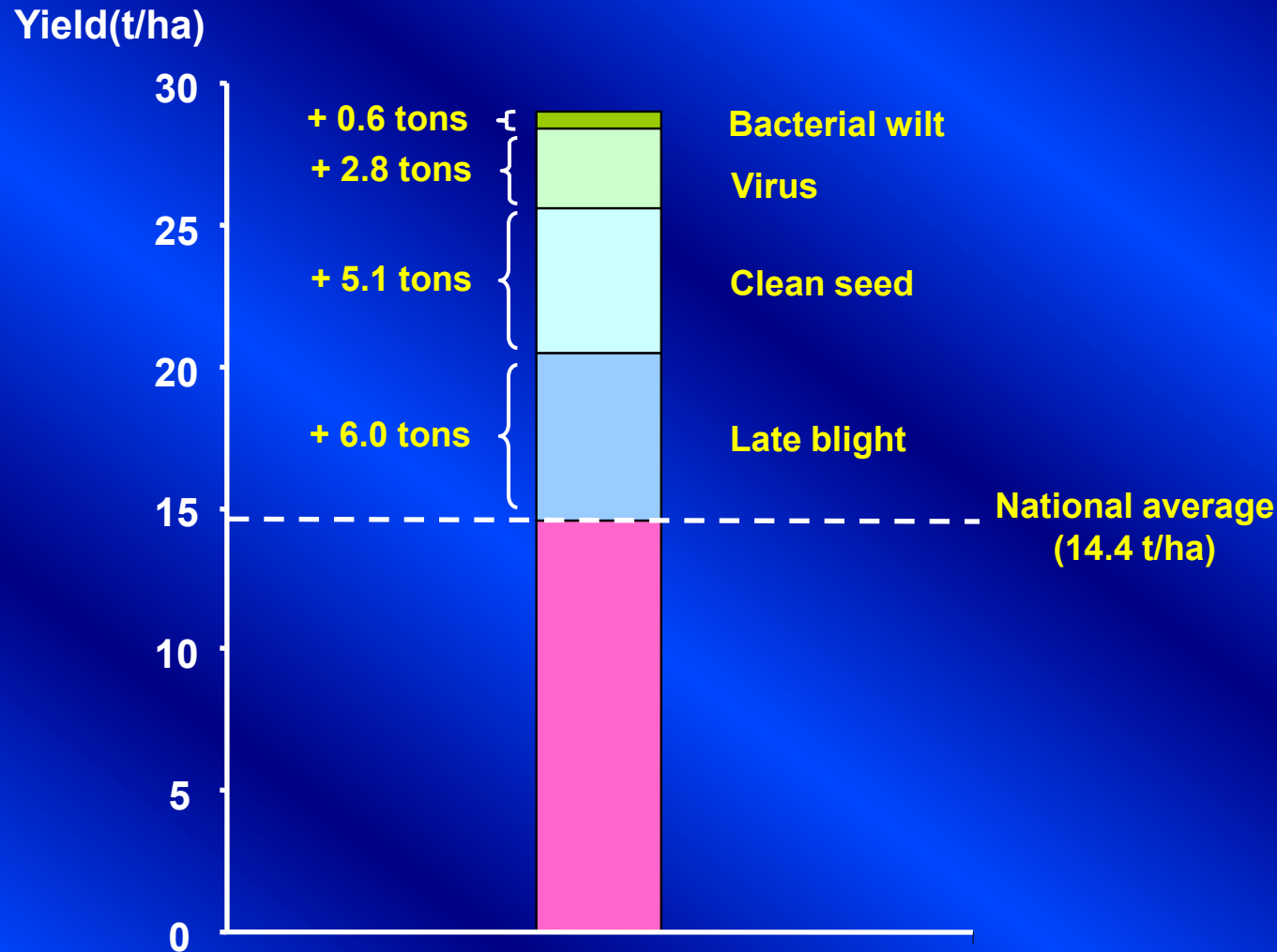
Production – 70 million MT

Area – 4.9 million ha

Yield – 14.4 t/ha

Source: www.faostat.org

Potato yield gap analysis (expert panel)



Source:

a) Keith Fuglie. 2007. Research Priority Assessment for the CIP 2005-2015 Strategic Plan: Projecting Impacts on Poverty, Employment, Health and Environment.

b) Yearbook of China Agricultural Statistics. 2005



Winter potatoes covered by rice straws





Potatoes in winter season

- **Planting potatoes in winter season in South China**

Winter fallow rice field:

13-20 million ha

The highest yield:

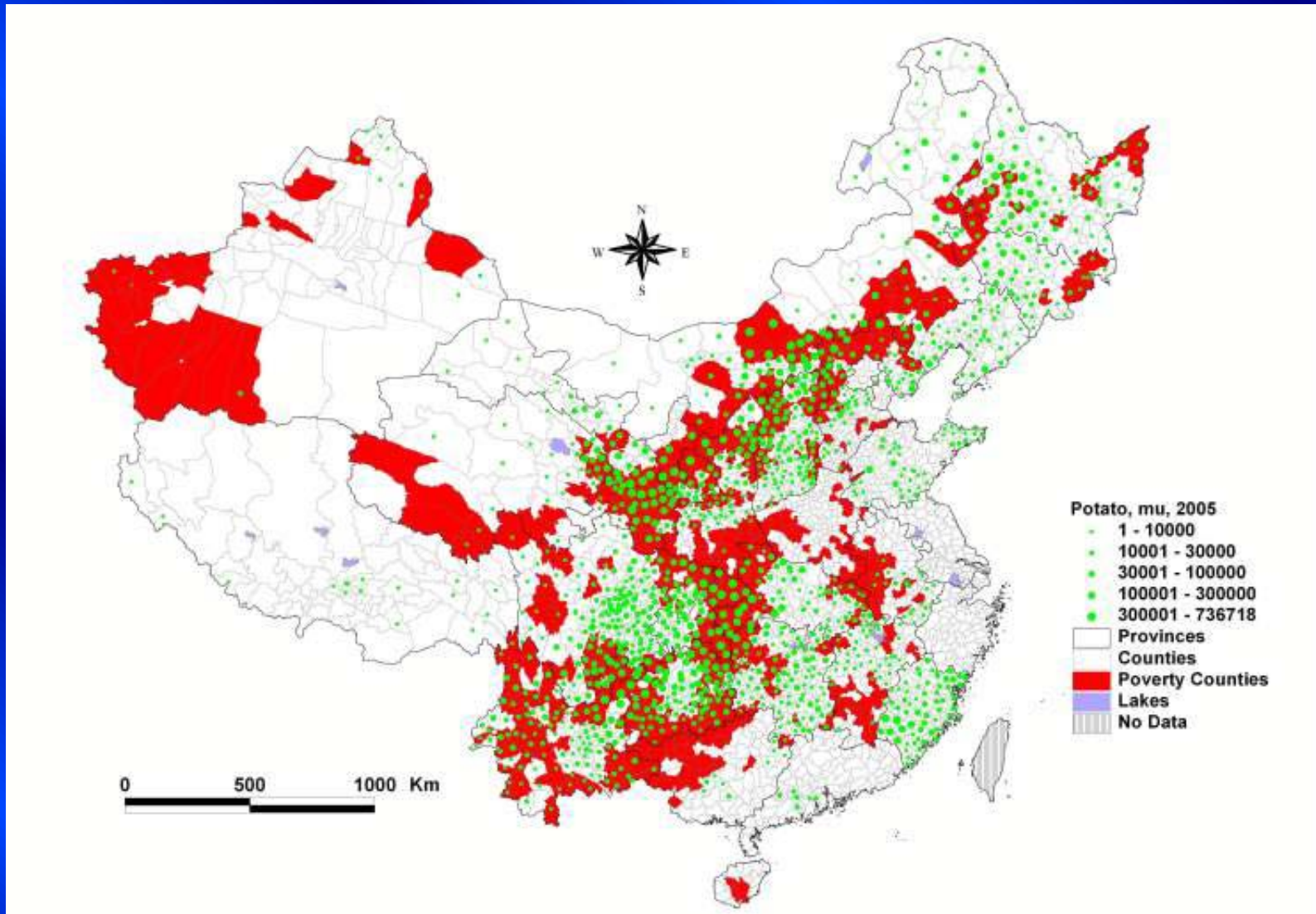
30 ton/ha

Market:

**Local and
abroad**



Potato production and poverty in China



CIP-CHINA CENTER FOR ASIA AND THE PACIFIC

4 February 2010



中华人民共和国政府与国际马铃薯中心 国际马铃薯中心亚太中心东道国协议



The Host Country Agreement between the Government of the People's Republic of China and the International Potato Center Regarding the Establishment of the CIP-China Center for the Asia Pacific Region (CCCAP)

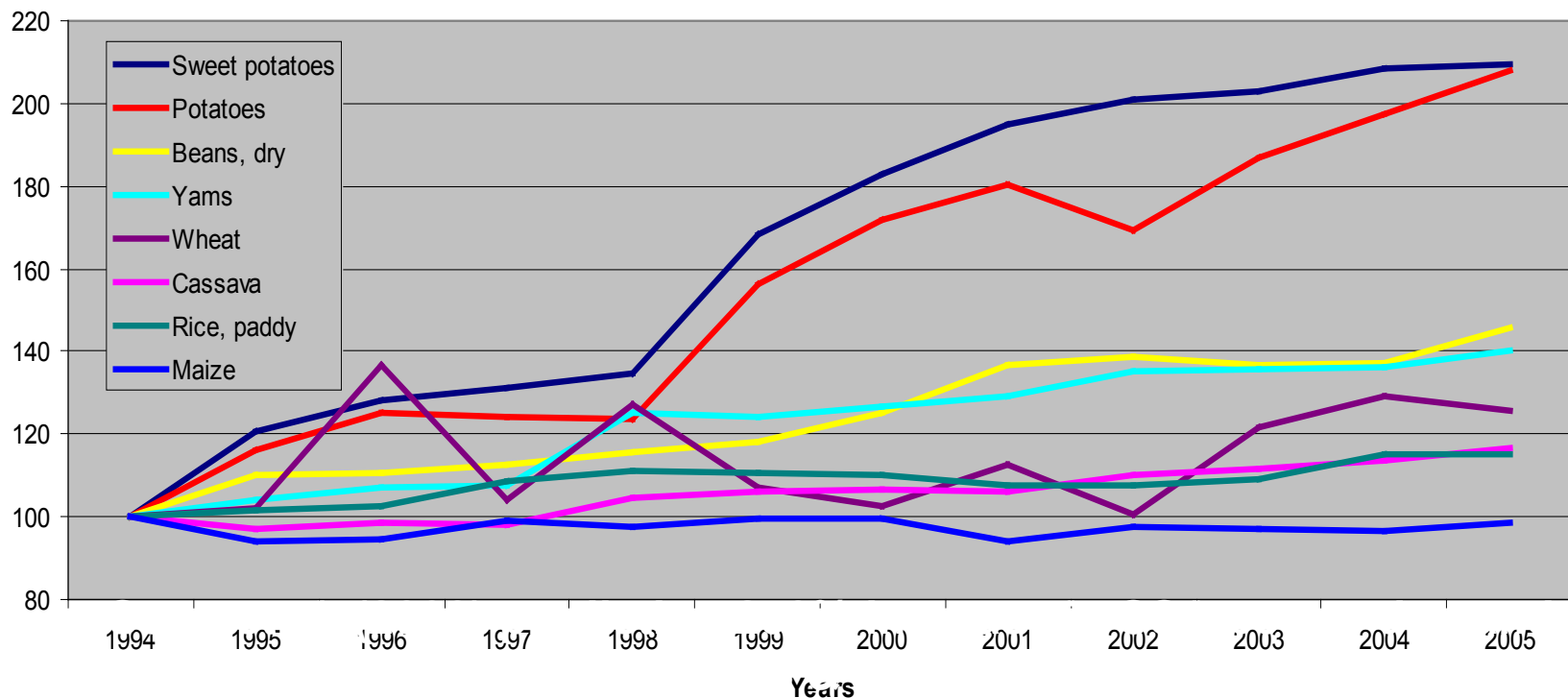


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**Sub-saharan Africa -
Increasing rural incomes**

Tremendous growth over last decade in area planted to potato in Sub-Saharan Africa (SSA)

Major African Field Crops Area Growth
1994-2005 (source www.faostat.org)



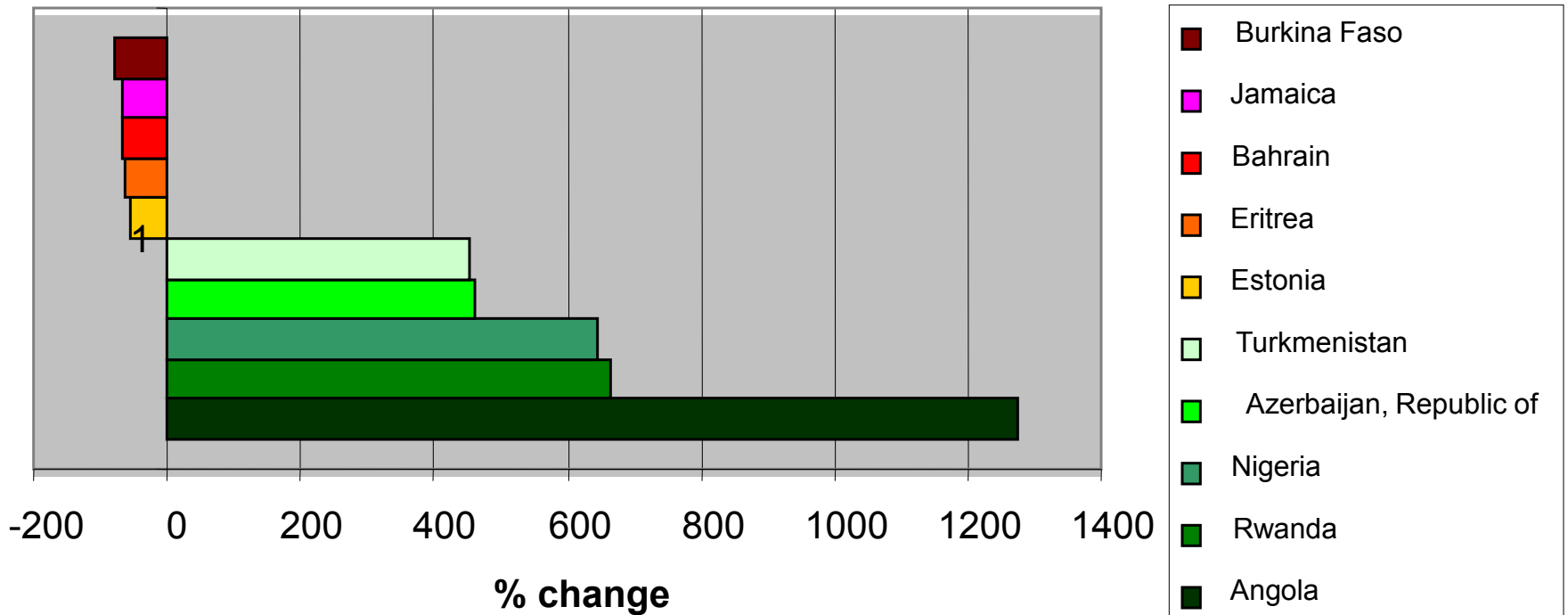
Most of the growth was in the ECA

Sub-region	Share of area
ASARECA	71%
SADC	21%
CORAF	8%

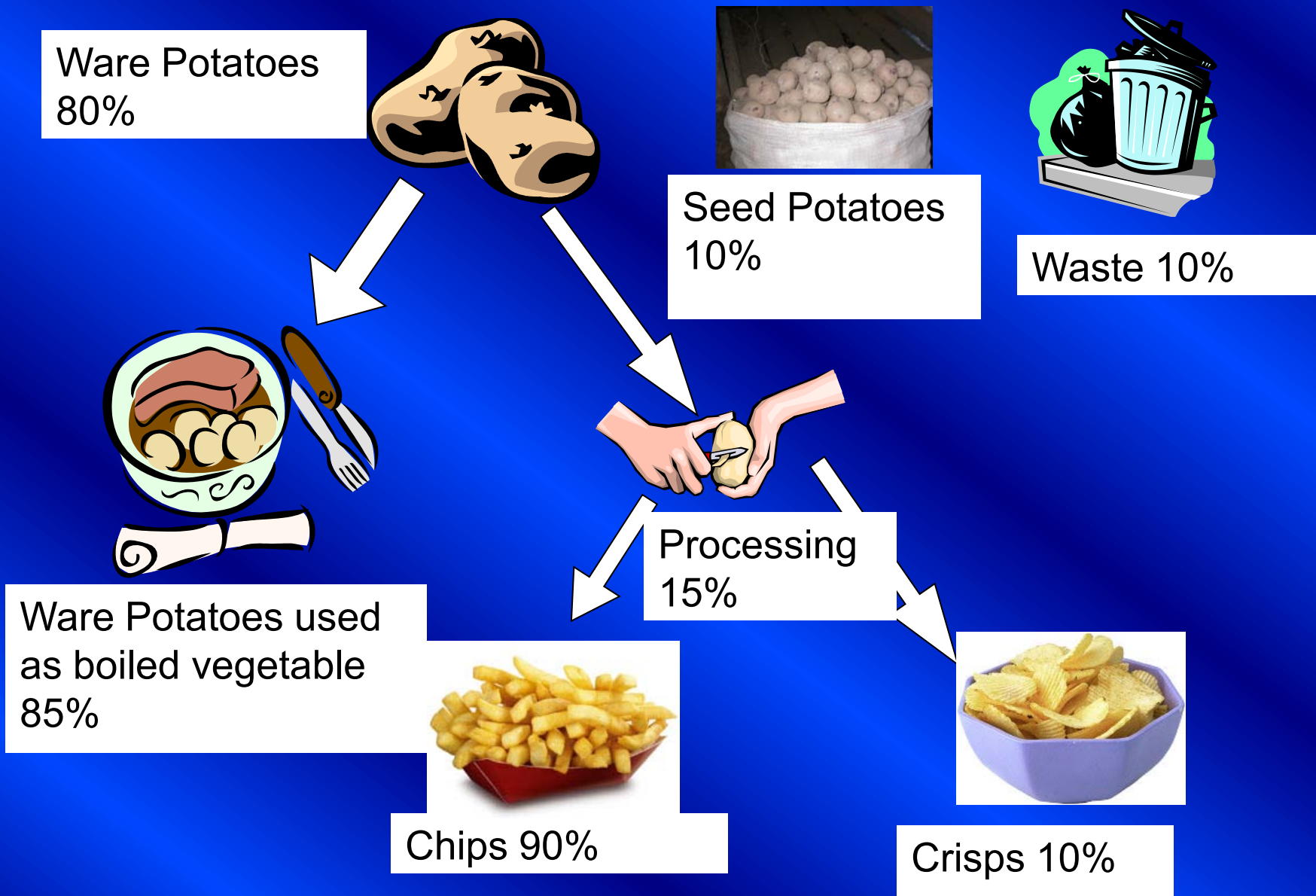
Source: www.faostat.org

Percent change in potato production in selected countries, 1994-2004

(3yrs average)



Utilization of potatoes in the ECA countries



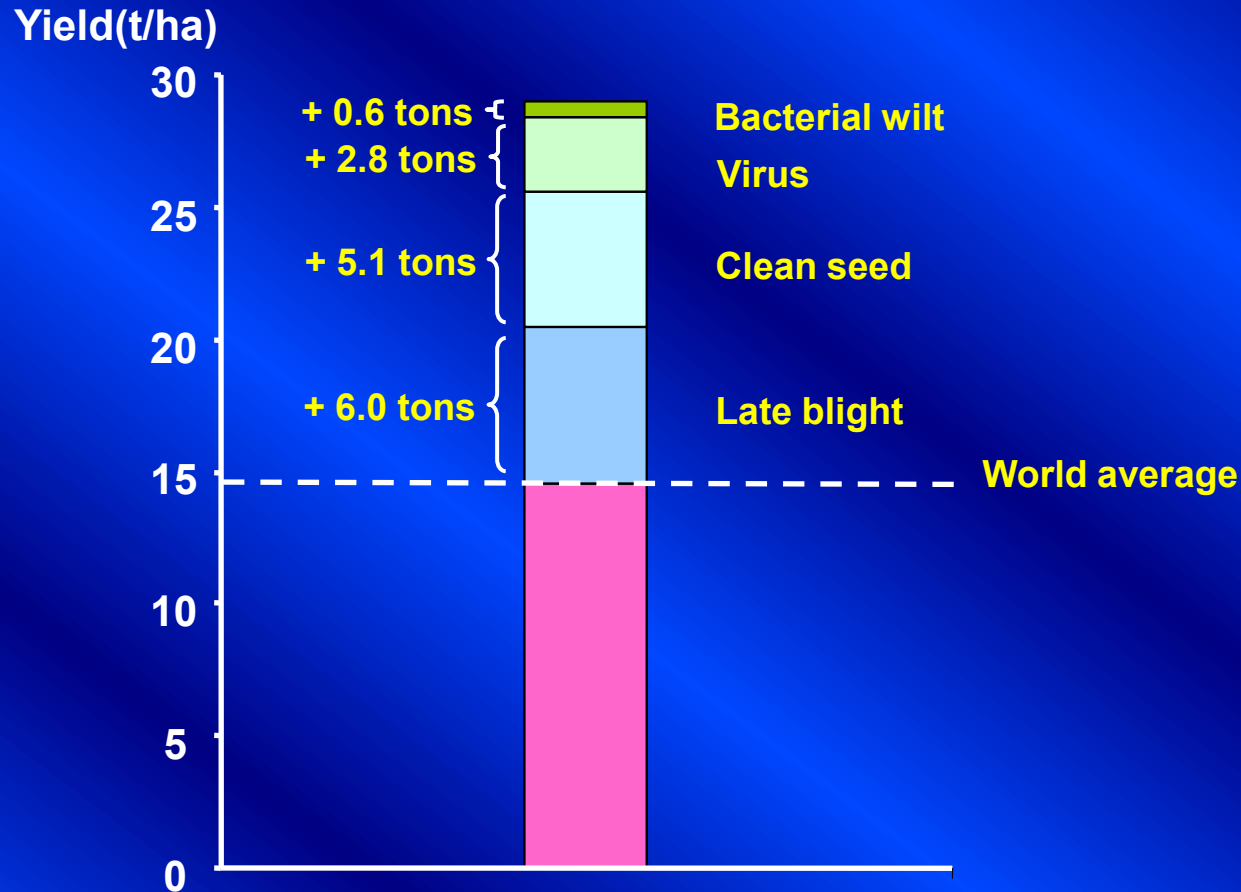
A Masaai group in Kenya supply Steers and Njoro canning with processing potatoes about 8 tons/week

Receive > US \$2000/acre/year

From barley they get about \$US 200/year/acre



Potato yield gap analysis



Source:

a) Fuglie, 2007. Research Priority Assessment for the CIP 2005-2015 Strategic Plan: Projecting Impacts on Poverty, Employment, Health and Environment.

Demand for potato seed is great, but often unfulfilled

Availability of certified (formal) seed as a percentage of need

■ Kenya	1%
■ Peru	2%
■ China	20%
■ Argentina	60%
■ United Kingdom	66%
■ Holland	99%

Aeroponics system yielded multiplication rates of up to 50:1 with CIP varieties



Benefits of Aeroponics

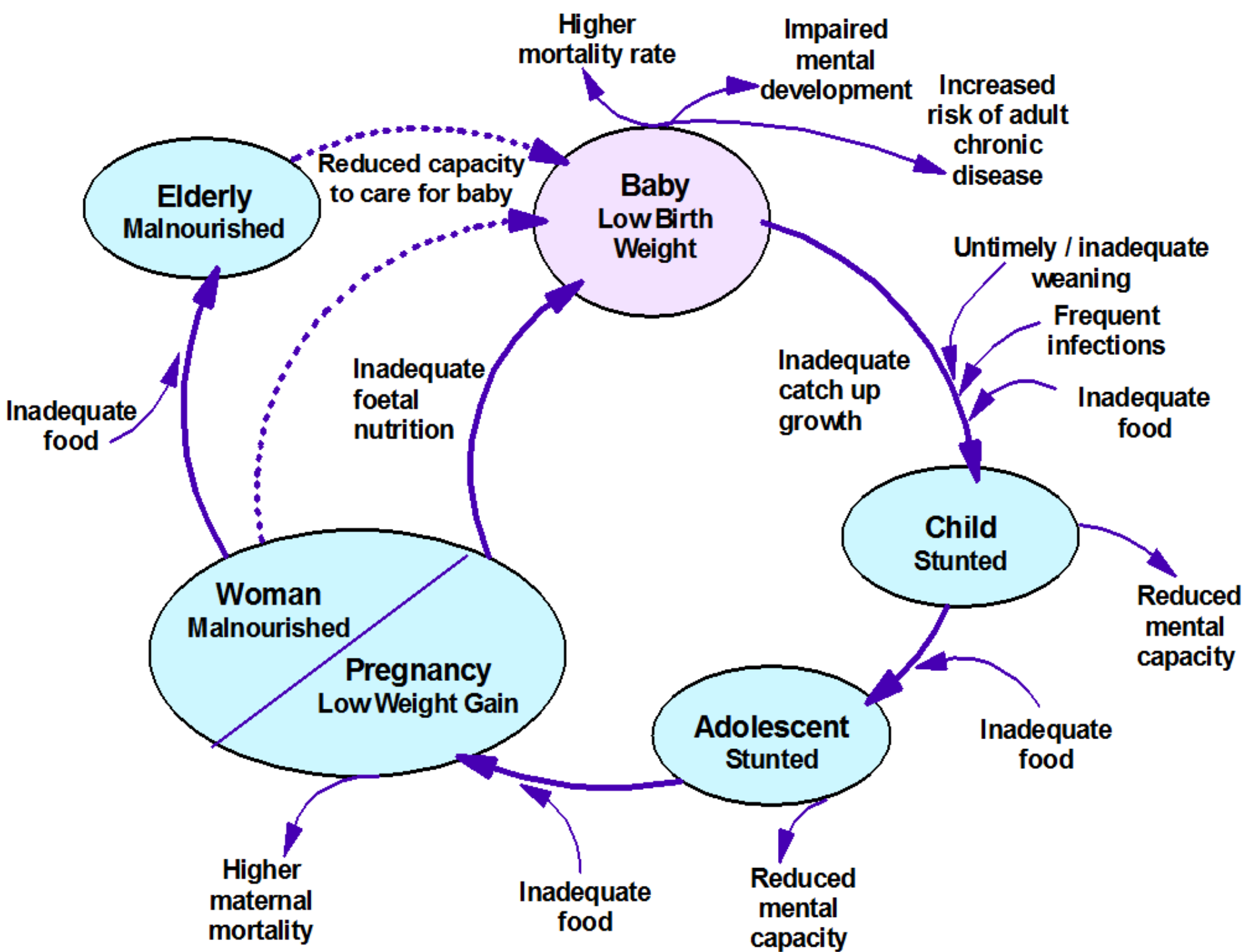
- Increase in multiplication rate from 5:1 to 50:1
 - Reduced field generations- less disease and less pressure on land
- No need to sterilize substrate
 - Ban on methyl bromide
 - Rising energy prices
- 1% of conventional water usage
- Reduction in cost of pre-basic tuber production from 12 cents to 4 cents

Public – Private Seed Systems

1. Ethiopia
2. Kenya
3. Uganda
4. Rwanda
5. Malawi
6. Angola
7. Tanzania

3

Latin America -
Increasing nutrition



Age: 2 yr 9 mo

BW: 10.7 kg

Height: 78.3 cm



Age: 2 yr 6 mo

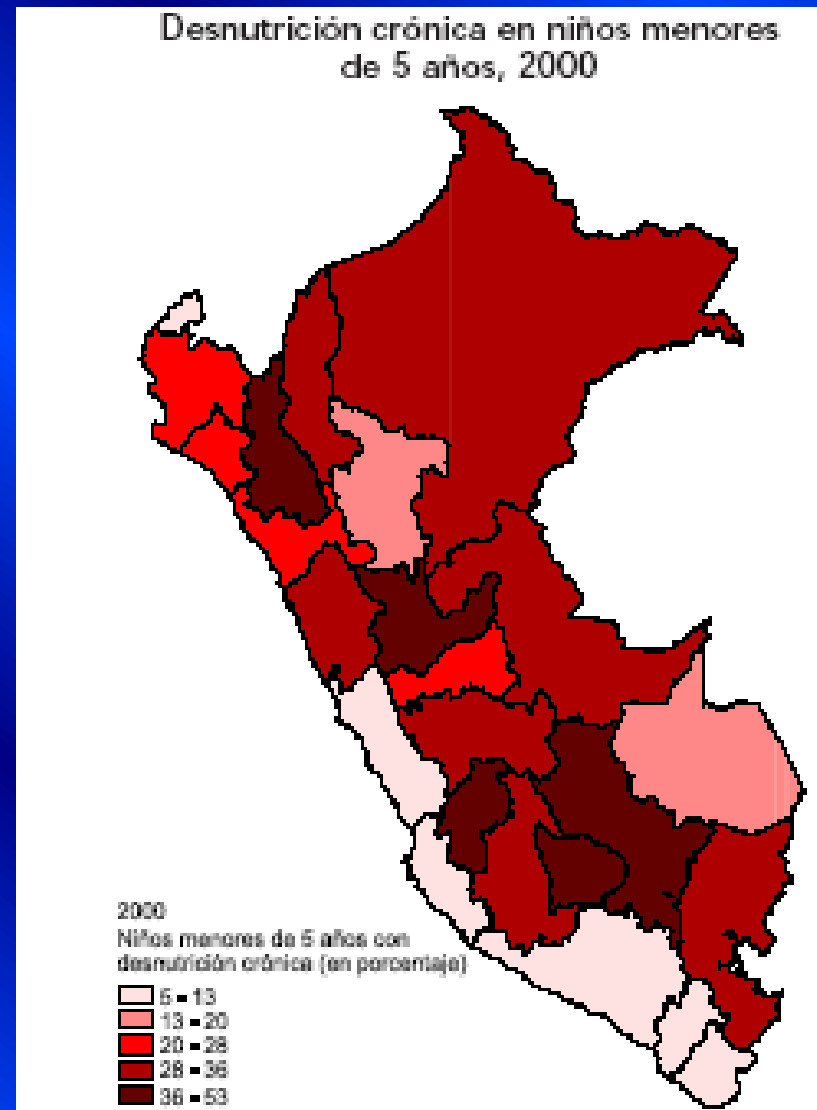
BW: 11.6 kg

Height: 86.4 cm

Girls from ANDAHUAYLAS

(Photograph: Courtesy of UNICEF)

% of Children < 5 yr with Chronic Malnutrition

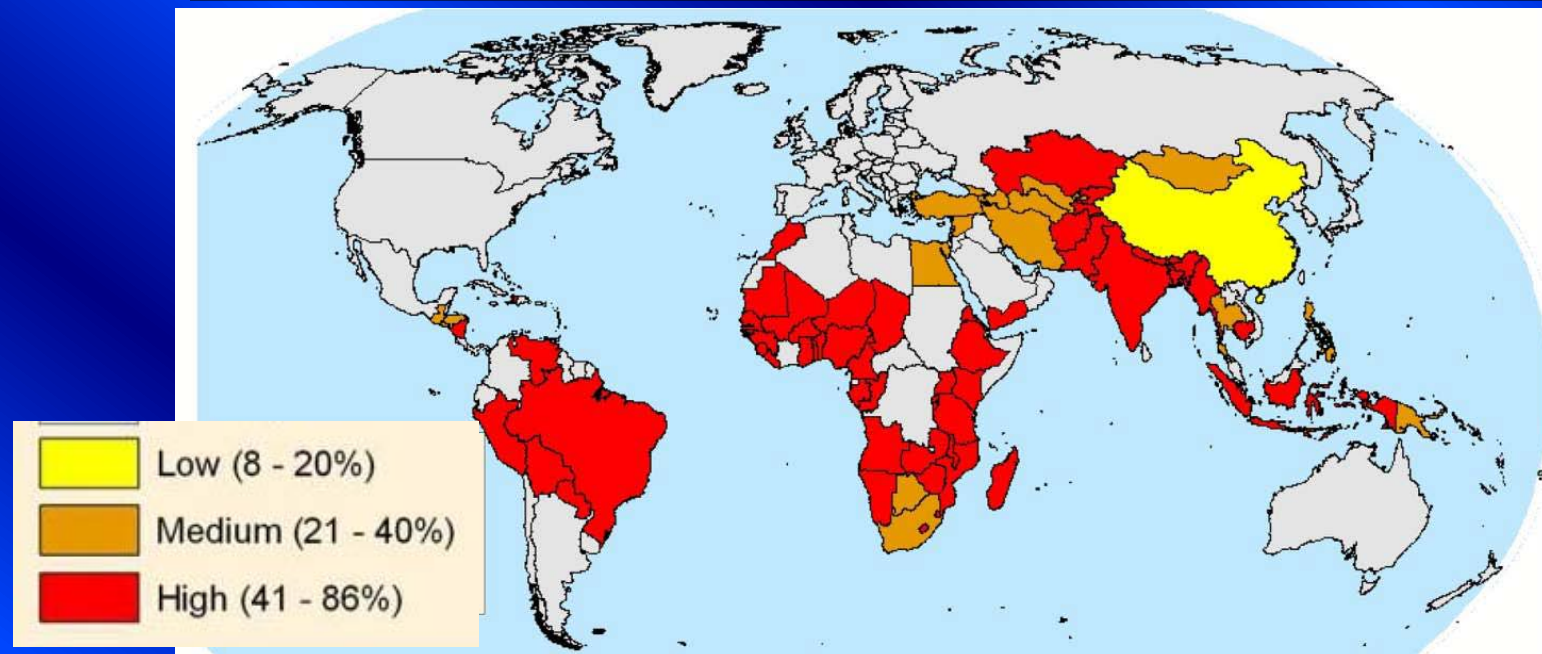


Micronutrient Deficiencies → "Hidden Hunger"

3.5 billion people in the developing world are iron deficient

Women and children are the primary victims

Prevalence of IDA among children <5 years old



Fe and Zn Deficiencies

Implications for Human Health and Development

- Zinc deficiency anemia

affects 90,000 mothers
during childbirth/year
millions in developing
countries

- Impairs mental
- Growth failure
- development and
- Susceptibility to
- learning capacity
- infections
- Limits capacity to
- Diarrhea; skin lesions
- perform physical labor



Biofortification



- The process of breeding new varieties of staple food crops with increased mineral & vitamin content
- Complementary to other strategies for reducing malnutrition: supplementation, fortification, diet diversification
- Nutritional benefits come from the crops - with no additional costs

Screening Native Potato Germplasm

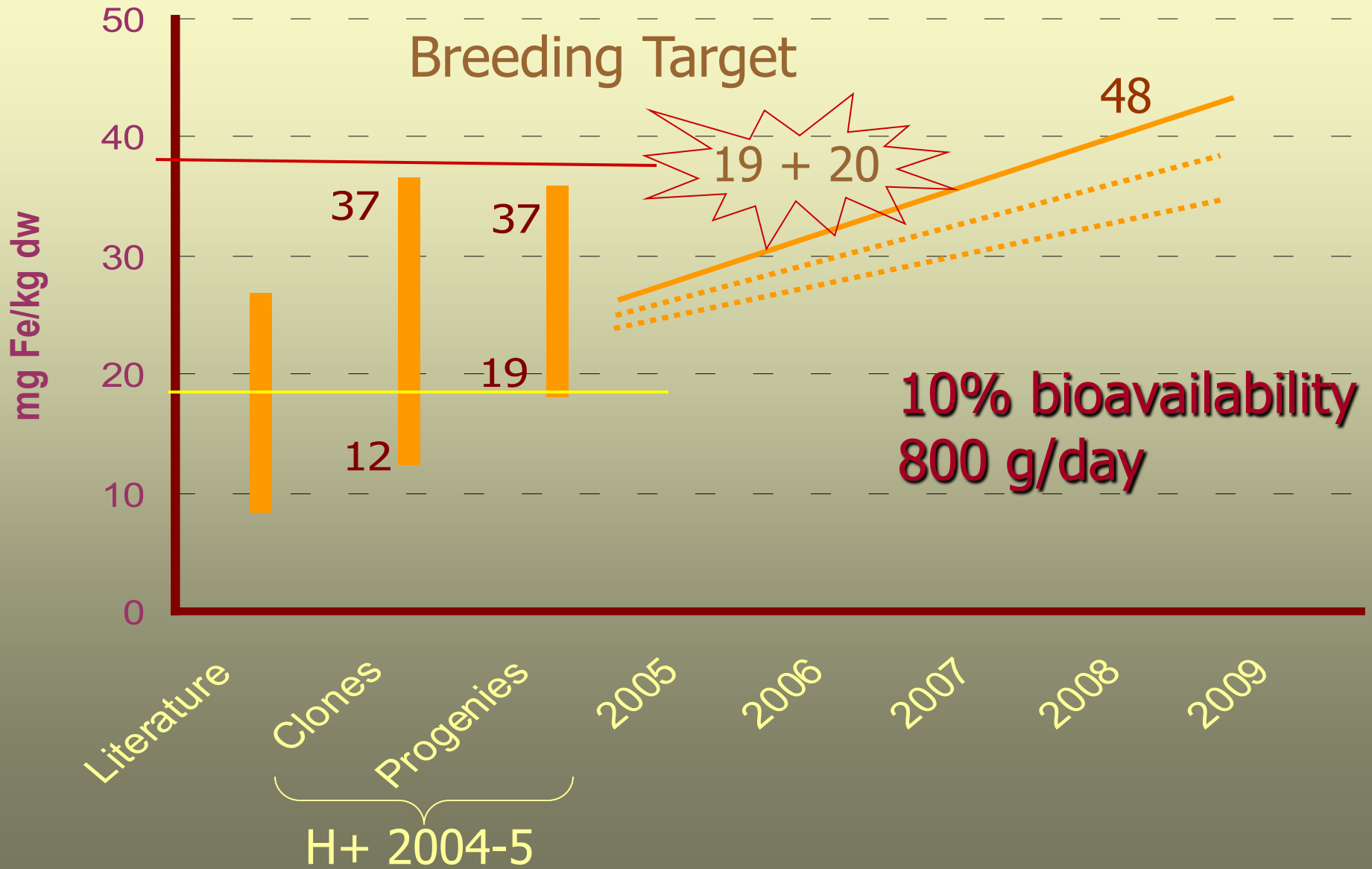


Variability in the micronutrient concentration of the potato germplasm

(Dry weight basis)

	Previous reports	HarvestPlus CIP
Fe (mg / kg)	8 - 26	12 - 37
Zn (mg / kg)	8 - 17	8 - 31
Vitamin C (mg / 100 g)	42 - 100	22 - 140
Phenolic Compounds (mg / 100 g)	40 - 1108	115 - 2401

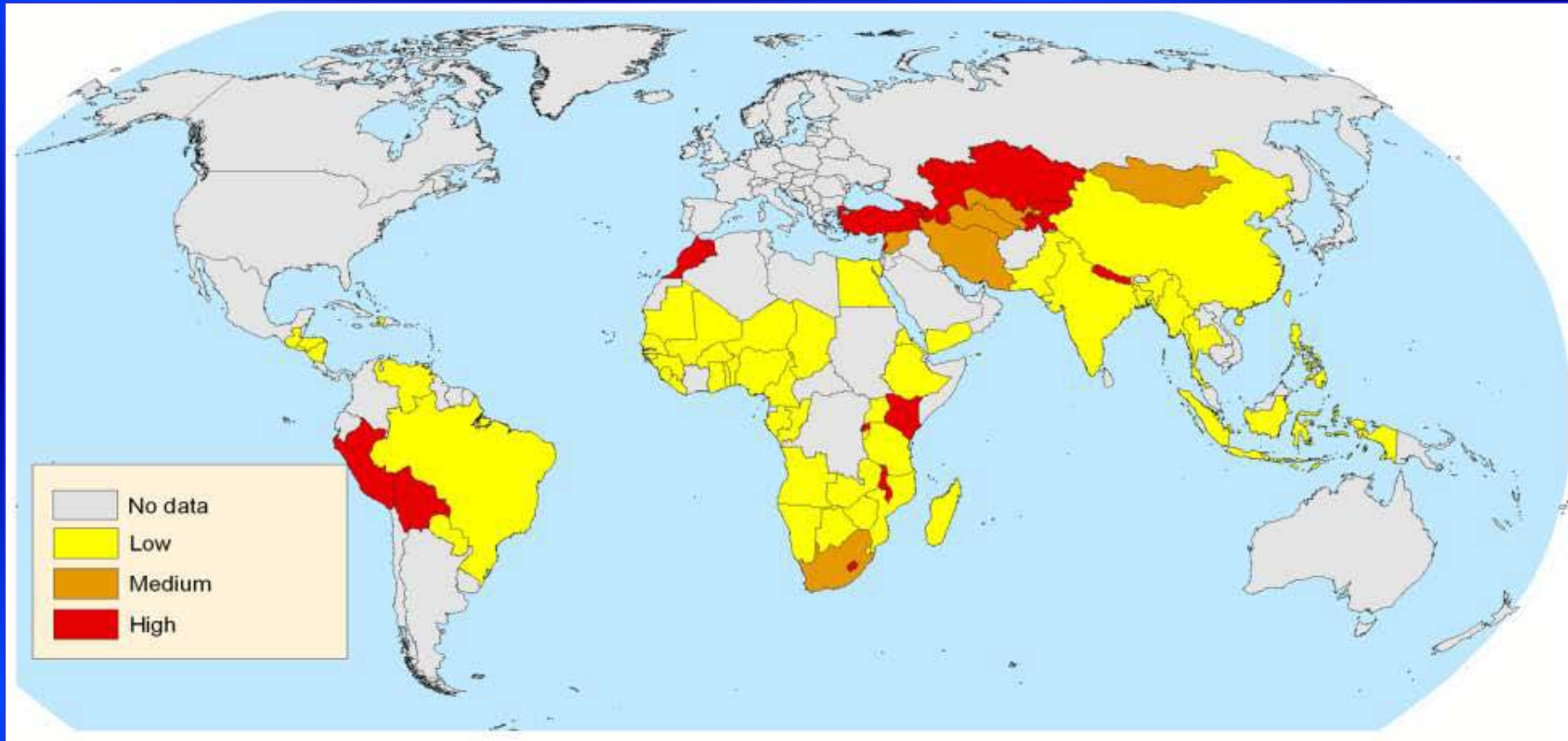
Ranges of Fe in potatoes and projected advance by selection



Biofortification of Potatoes

- Potato can be significant source of Fe and Zn
- Diversity and population parameters suggest significant genetic gains are feasible
- Measurable biological impact on population status is likely where consumption is high

GIS-Assisted Targeting Exercise



Target countries for potential impact on nutrition
from consumption of biofortified potato

Increasing Potato's Contribution to Food Security – The Challenges

- 1. Increase field productivity**
- 2. Increase system productivity**
- 3. Link small farmers to market**
- 4. Develop public-private partnerships**
- 5. Biofortification**
- 6. Public awareness – benefits of potato for the global food security**

