

# DEVELOPMENT OPPORTUNITY CROPS

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Presented by  
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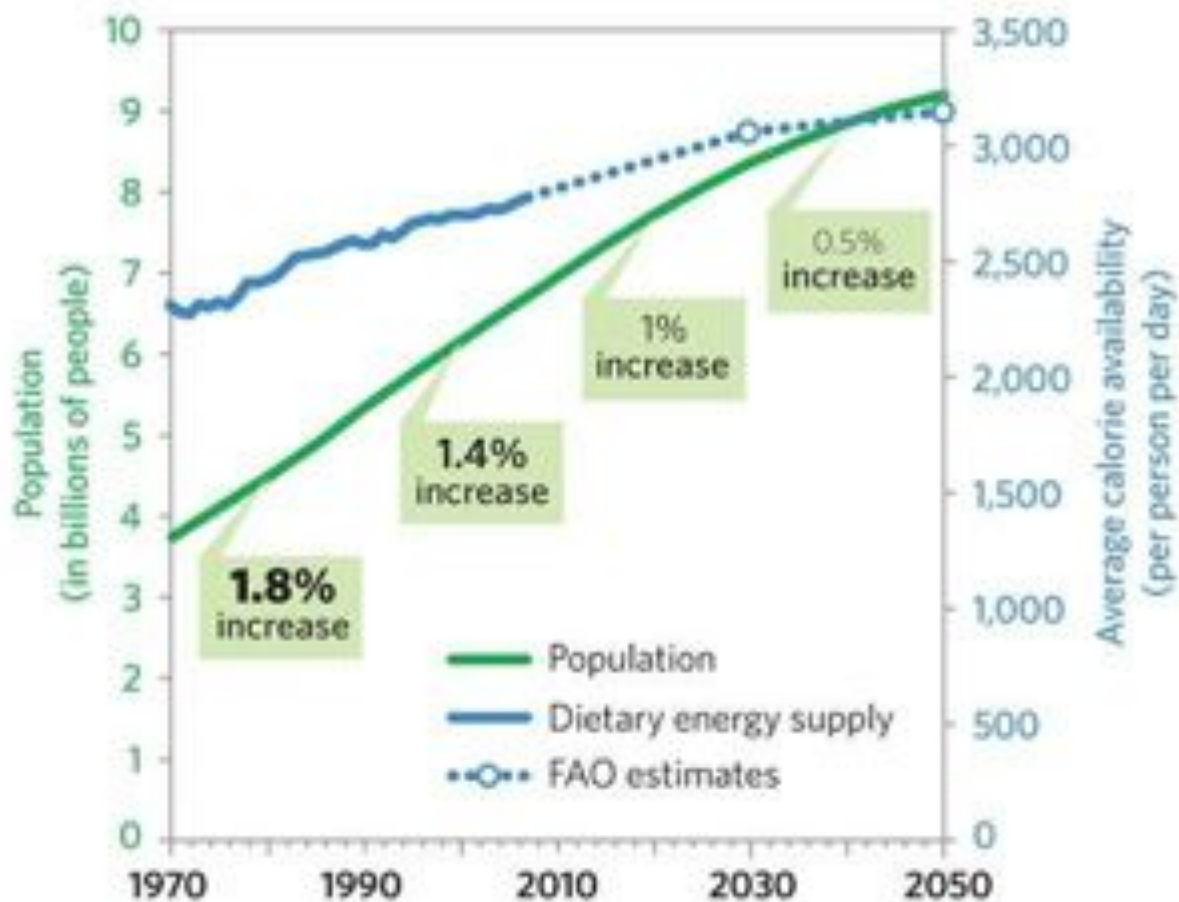
# Structure

- Background
- Development Opportunity in Diversity Initiative
- Three pillars of the Initiative
- Case studies
- Potential collective action



# Background

- Projected **population increase** = increased need for food production
- Persistent **malnutrition** (“hidden hunger” and non-communicable diseases)
- **Environmental degradation**
- **Climate change**



Sources: Nature 466 (2010)

# Diversity in production systems contributes to sustainable development

There is urgent need to:

- Initiate solid and inclusive projects to build concerted and practical actions on sustainable use;
- Mobilize regional and international actions in support of national needs;
- Strengthen evidence base for wider commitment and actions.

→ Therefore we have formed a multi-stakeholder platform

# Development Opportunity in Diversity Initiative



Food security,  
nutrition and  
health



Source of  
income



Resilience of  
farming  
systems and  
environmental  
services

**Inclusive Research, Capacity Building, Knowledge Management, Advocacy**

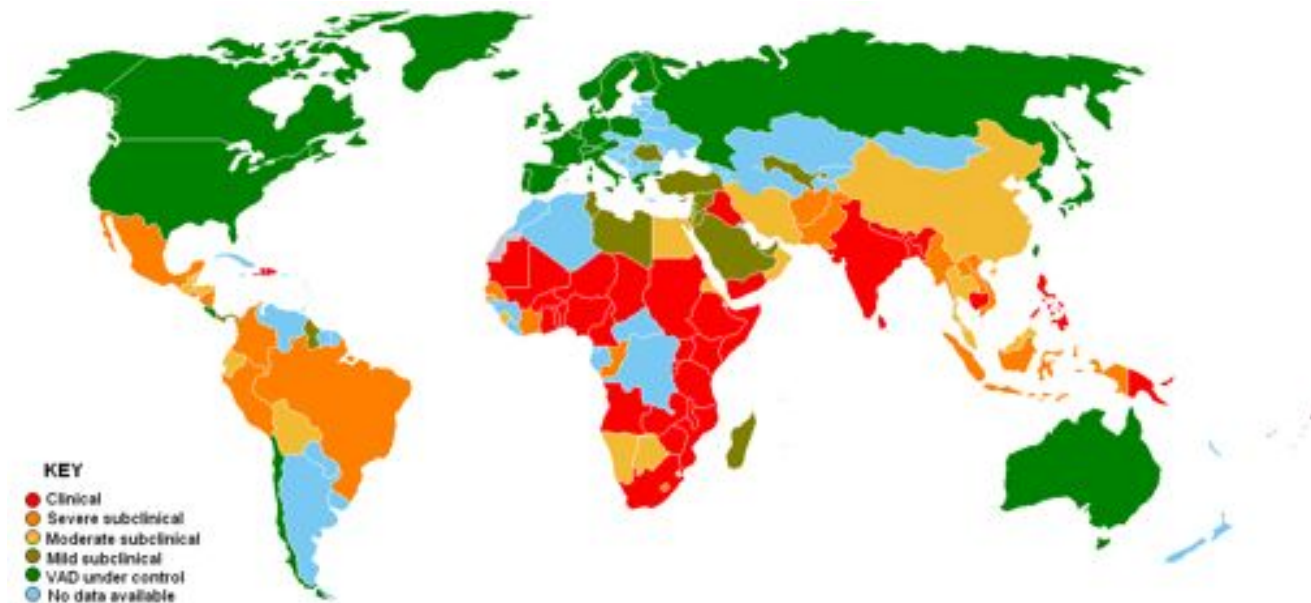
# Stakeholders

- Global Forum on Agricultural Research
- Regional and sub-regional organizations and their relevant initiatives
- CGIAR Centers and emerging Consortium Research Programmes
- International centers, organizations and initiatives
- National research and/or development organizations
- Non-governmental organizations/Community-based organizations
- Private sector

# Three pillars of the Initiative

# Pillar 1: Food security, nutrition and health

- Demand for food projected to increase by 70% within the next 40 years
- At least 2 billion people are experiencing malnutrition
- Diverse diets help address malnutrition and health



Vitamin A deficiency

Source: Wikipedia



# Pillar 2: Income opportunities

- Increase of urbanized population (net consumers)
- Opportunities to reach into (niche) markets for diversified high-value agricultural and horticultural products



# Pillar 3: Environmental sustainability

- Climate change
- Degradation of agro-biological diversity
- Importance of diversity in cropping systems to buffer risks
- Conservation / use of diverse genetic resources



# Case studies on crops

# Mungbean in Asia:

From underutilized crop to important part of rural livelihoods

Some relative benefits:

Earlier maturing and more drought tolerant than soybean



Similar nutrition to cowpea grain but can be used as a vegetable or a grain



More drought tolerant than dry beans (*Phaseolus vulgaris*)



Potential to enhance diets, to diversify cereal-cereal cropping systems and to generate additional income for the poor



AVRDC - The World Vegetable Center

# Research 1980s-2000

- Key production constraints of un-improved mungbean:
  - Long growth period (90-110d) does not fit between major crops
  - Indeterminate harvest (requires several harvests)
  - Major pest and diseases
  - Low yield
  - Shattering
- Research goals:
  - Shorter growth period of between 60-75 days
  - Stable production >2 t/ha
  - Pods mature at the same time, non-shattering
  - All the bean pods at the top of the plants
  - Resistance to major diseases and pests
  - Larger seeds
  - Higher content of lysine and methionine and reduced levels of phytic acid
- Participatory breeding (SAVERNET)

# Research results

- By 1990, 40 improved varieties released (19 in China, 6 in India, and others in Australia, Bangladesh, Bhutan, Botswana, Cambodia, Costa Rica, Ecuador, Fiji, Indonesia and Korea)
- By 2000, more than 25% of world production with AVRDC improved varieties
- 12% increase in production: 1985-2000



# Impact

- Improved mungbean production revenue estimated at US\$20 million per year in Pakistan
- Potential increase of productivity of anaemic female workers up to US\$ 3.5-4.2 million annually in Pakistan
- Supplementing diets with high-iron mungbean improved the children's overall physical stamina in India
- Research needs: broader genetic base for nutritional quality, waterlogging tolerance; seed availability



# Maca in Peru

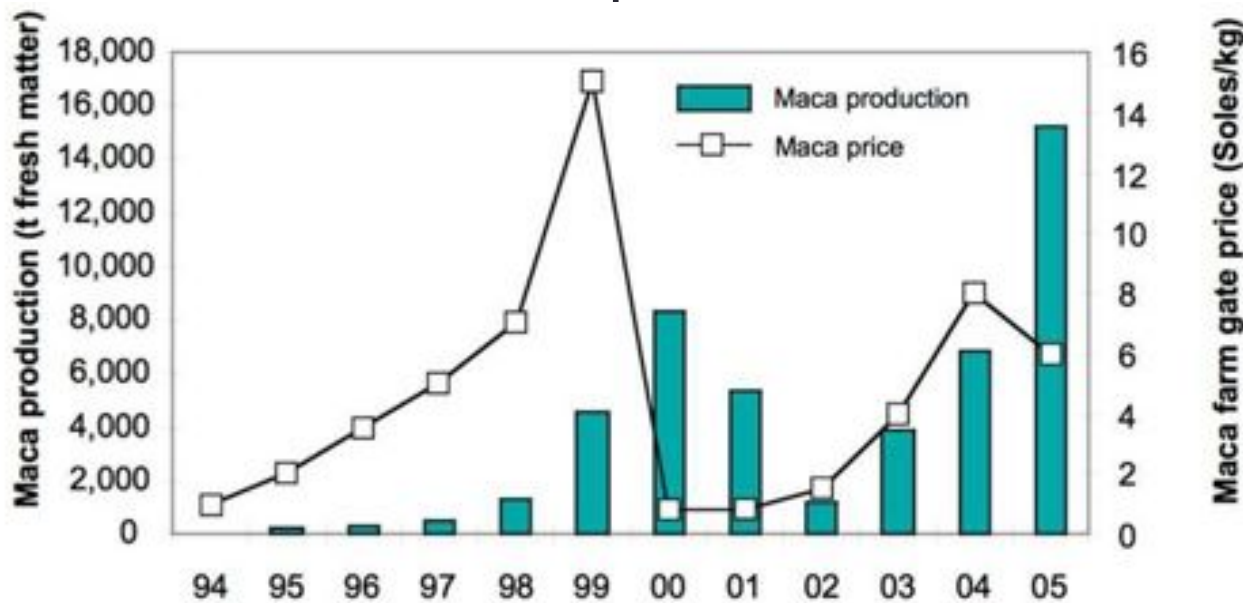
- *Lepidium meyenii* - edible root crop endemic to the high Andes
- Growth area ca. 50 ha in late 1980s
- Used as local food additive and stimulant ('Ginseng of the Andes')





# Increased demand leads to increased production

- Since early 1990s aggressive promotion on internet and in export markets
- Development of novel food products
- Area under maca in 2005: 3,000 ha
- Farmers invest in infrastructure, education, transport



# Foiled expectations?

- Lack of coherent marketing approach
- Inability to prove medicinal benefits and maintain quality
- Difficulties to access foreign markets, due to restrictive legislation
  - market crash in 2000

But:

- Maca is still an important cash crop for local small-scale farmers
- Income US\$1,000/ha far higher than any other activity
- Development of market chain infrastructure
- Increased self-esteem of native population

# Bamboo in Zhejiang-Lin'an, China



**Mid-elevation: Bamboo and mixed forests**

**Rice and other agricultural crops**

# Approach of the research consortium and county government:

1. Scientific planning
2. Protection, rehabilitation and reconstruction of the local ecosystems
3. Developing environment friendly products/enterprises
4. Participatory decision making
5. Disclosure of rural areas
6. Development and implementation of supportive policies



# Impact

Indicator	1980	1990	2000	2009
Total population	450,200	494,000	512,000	526,000
Rural population	414,500	444,000	429,000	416,000
Per capita GDP (USD)	300	400	1,600	6,500
Poverty index	60	40	5	benefits
Forest area (1000 ha)	n/a	117	121	140
Bamboo forests (1000 ha)	n/a	36	56	65
Bamboo value (mln USD)	n/a	15	90	404
Bamboo value (mln RMB)	n/a	72.2	750	2,760
Nature reserves (ha)	n/a	1,899	4,626	7,994
Paved roads rural areas (%)	n/a	70	99.5	100
Washing machines (/100 rhh)	0*	12	52	88
Cell phones (/100 rhh)	n/a	n/a	18	204

Notes: n/a – not available; benefits – local government provides benefits to poor people; \* - 1982; rhh – rural households

# Lessons learned from case studies

Species diversity in and between agricultural systems should be studied more intensively to enhance its contribution to sustainable and productive development

Success enhanced by:

- Appropriate & holistic partnership approach
- High-quality local and national level adaptive research
- Capacity building
- International exposure
- Supportive policy environment
- Long-term and reliable funding

# Potential collective action in research:

Building upon existing initiatives and forging new partnerships, and working across crops rather than on individual crops

- Multi-locational trials on crop climate adaptation
- Product diversification and market approaches
- Decision Support Systems to determine priority species in agricultural systems
- Payment schemes for agrobiodiversity / ecosystem services
- Developing a user-friendly knowledge base (incl. traditional knowledge)
- Capacity building and curricula development

# Linking the Initiative to CRPs.....

Three thirds principle

- Planning & engagement:  
the Initiative a specific partner for DOC in CRPs
- Research:  
system research, sentinel sites, 'sentinel crops' ?
- Implementation:  
proof of application





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**Thank you very much for your attention!**