



Food and Agriculture Organization  
of the United Nations

# Contribution of Genetic Resources to Food Security and Nutrition

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CGRFA Special Event  
Food security and genetic diversity

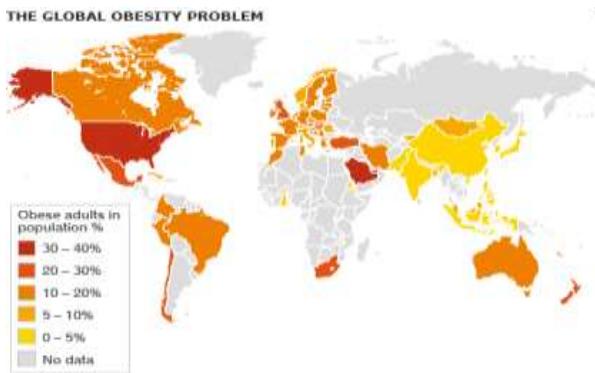
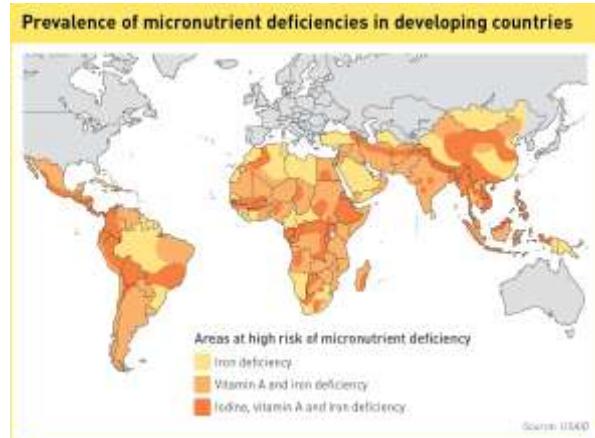
FAO, 16 January 2015



IMPLEMENTING THE GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES

# Global nutrition situation

- **Double burden of malnutrition**  
Undernutrition and micronutrient deficiencies are persisting. Obesity is endemic also in developing countries.
- **Increased consumption of animal products** (e.g. China and India) and of processed foods.
- **Simplification of diets** and shift towards westernized diets.
- **Medicalized approach** (fortification and supplementation) instead of a food-based approach using foods.



SOURCE: World Health Organization, 2006



# Astronauts' diets

## NASA (America)

- Foods only
- no supplements except for vitamin D



**Is this achievable on earth?**



# Biodiversity and Nutrition

## Genetic resources/biodiversity

1. Nutrition is promoting a **diverse diet**, i.e. eat many different foods = **inter-species biodiversity**
2. **Intra-species biodiversity** is adding a new dimension below species level
  - varieties, cultivars and breeds
  - but also wild, neglected and underutilized foods

## Reason for importance:

differences in nutrient content **between** species are as high as **within** species (up to 1000 times)



difference between nutritional adequacy and inadequacy



# Differences in food composition

Food	Protein (g)	Fibre (g)	Iron (mg)	Vitamin C (mg)	β-carotenes (mcg)
Rice	3 x 5.6-14.6		0.7-6.4		
Cassava	0.7-6.4	0.9-1.5	0.9-2.5	25-34	<5-790
Potato	1.4-2.9	1-2.23	0.3-2.7	6.4-36.9	1-7.7
Sweet potato	1.3-2.1	0.7-3.9	0.6-14	2.4-35	100-23100
Taro	1.1-3	2.1-3.8	0.6-3.6	0-15	5-2040
Eggplant		9-19		50 - 129	
Mango	0.3-1.0	1.3-3.8	0.4-2.8	22-110	20 – 4320
GAC					6180 – 13720
Apricot	0.8-1.4	1.7-2.5	0.3-0.9	3.5-16.5  <i>&gt; 1000 x</i>	200-6939 (β-carotene equivalent)
Banana			0.1-1.6	2.5-17.5	<1 – 8500

All nutrients values expressed per 100 g edible portion EP on fresh weight basis (EP).



# Impact of food biodiversity on dietary adequacy

Protein content	Protein content (g/100 g)	Rice intake (g/d/p)	RDI for protein covered by rice intake (%)
Average	7	200	31
Minimum	5.6	200	25
Maximum	14.6	200	65

Banana	β-carotene content (mcg/100 g)	Banana intake in Philippines (g/d/p)	Vitamin A intake through banana in (mcg RE/d/p)	RDI for vitamin A covered by banana intake (%)
USDA	26	93	4	0.7
Lacatan	360	93	56	9
Utin lap	8508	93	1319	220



# How to achieve food security

**Objective:** to produce sufficient **nutrients** for a healthy diet for all at all times and ensure that a population is able to acquire foods in sufficient **quantity** and **quality** and to utilize them efficiently.

## Availability

- Agricultural production = foods for humans
- Not only quantity (yield and energy) is important but **quality** (esp. micronutrient content) = shift in paradigm
- Processed foods should contain good nutrient profiles

## Access

## Utilization

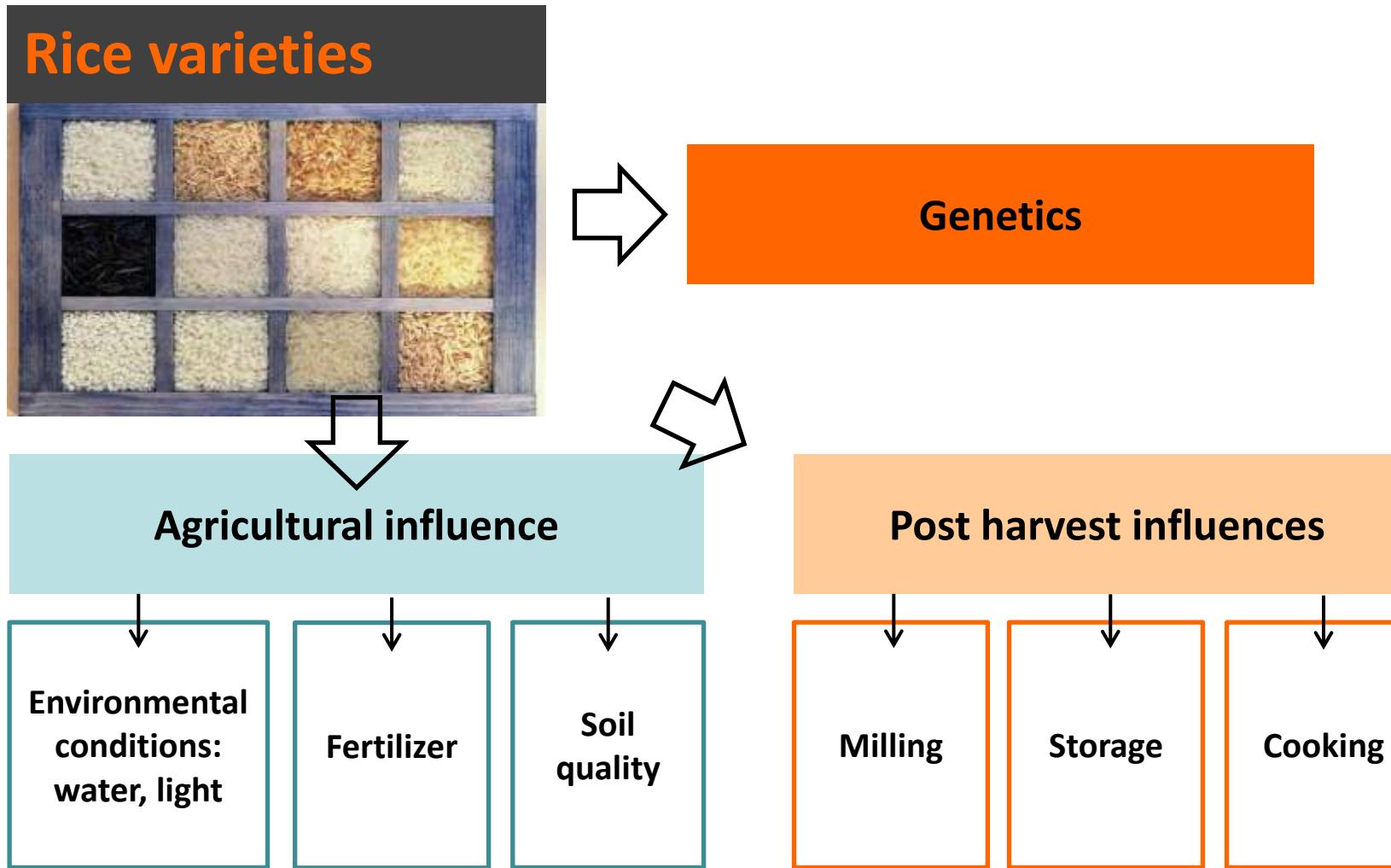
- Human body is in good health
- Foods and water are safe
- Consumers demand high quality foods
- Adequate intra-household distribution of foods

## Stability

- Economic, political, environmental and GR stability
- Sustainable agriculture conserving and utilizing GR
- Sustainable consumption



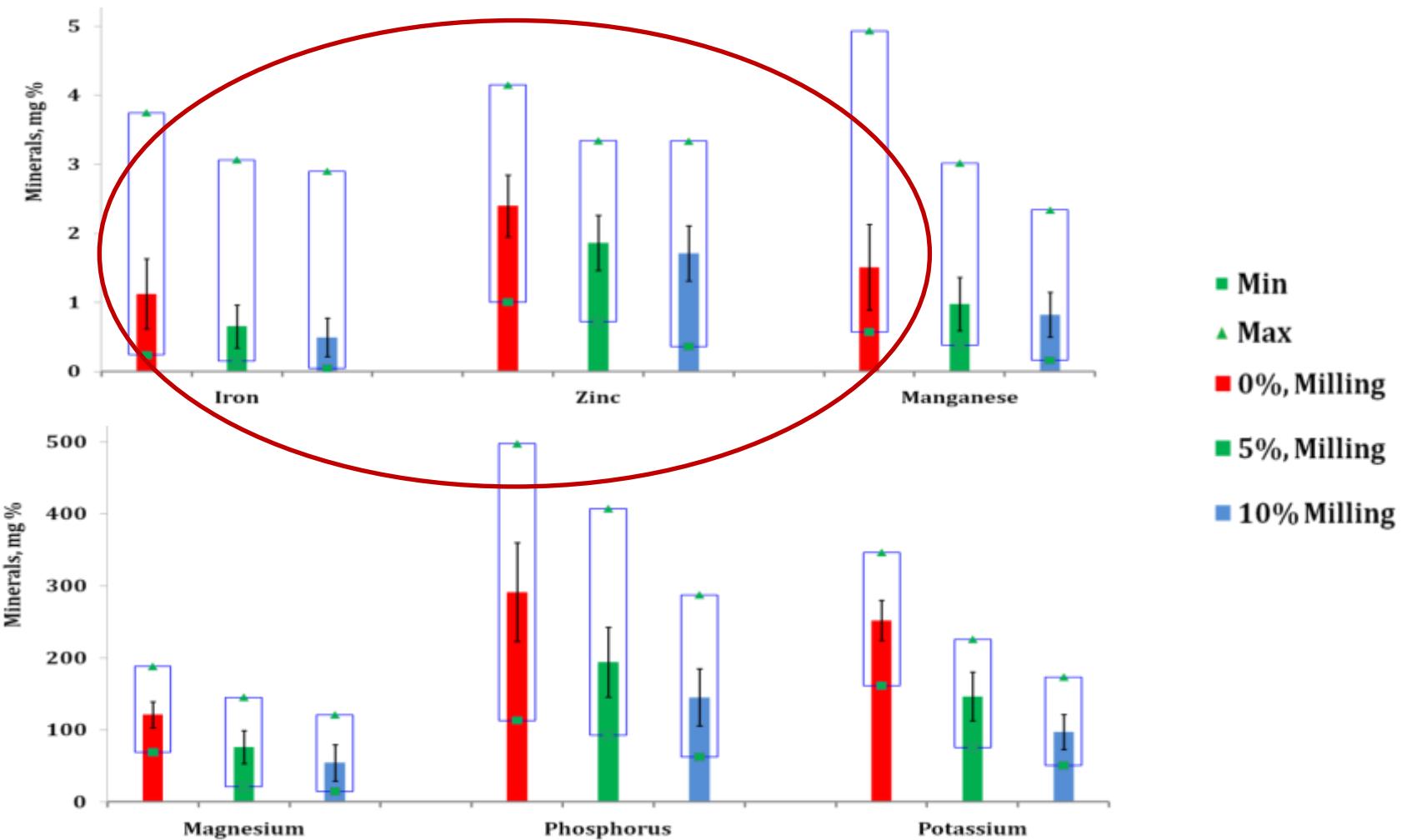
# Factors influencing nutrient composition of rice



Source: adapted from T. Longvah,  
NIN, India



# Effect of polishing on mineral content in rice varieties



Source: T. Longvah



# International Rice Commission

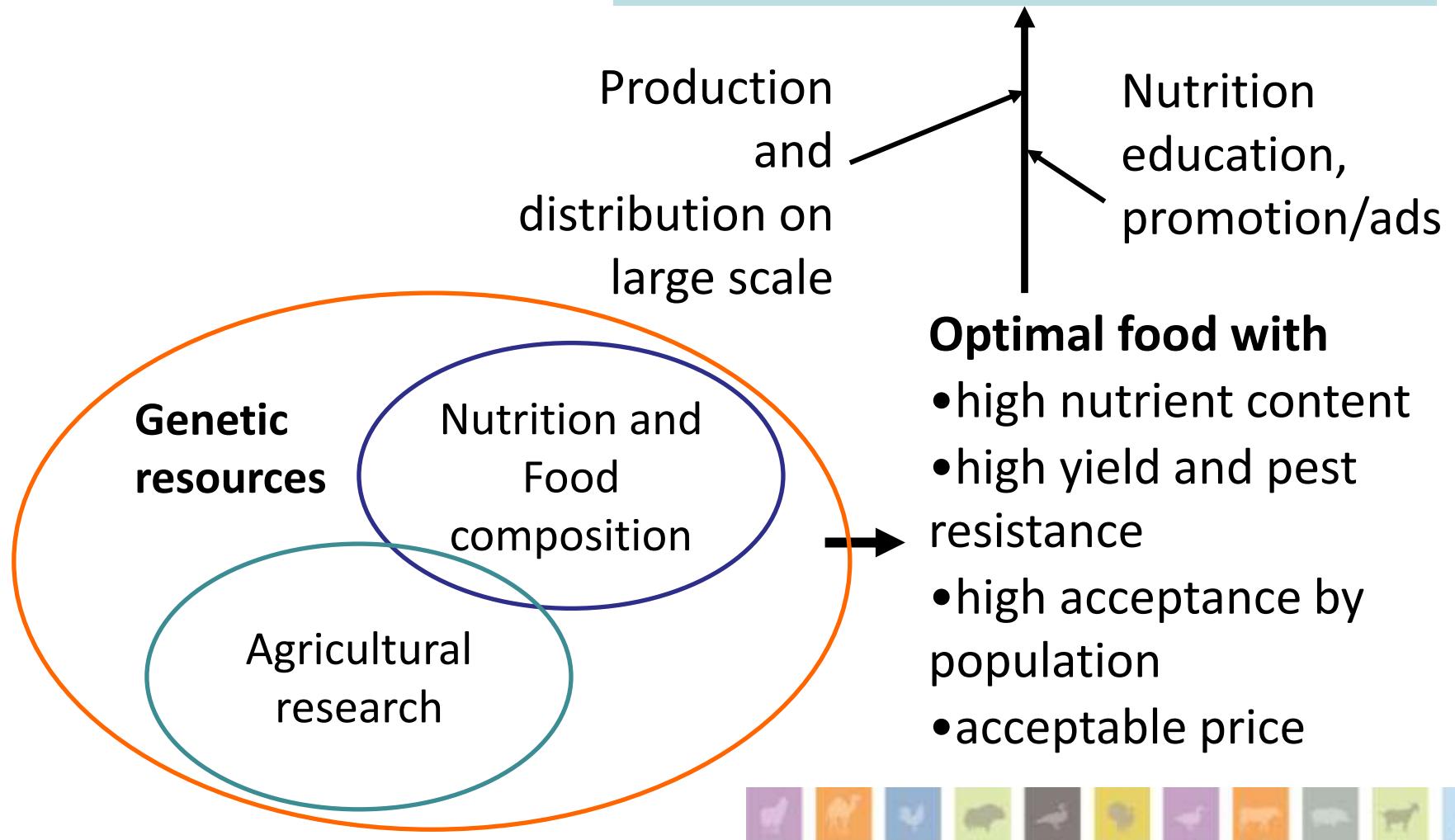
The Commission **recommended** that:

- Existing biodiversity of rice varieties and their nutritional composition need to be explored **before** engaging in transgenic research.
- Nutrient content needs to be among the criteria in cultivar promotion.
- Cultivar-specific nutrient analysis and data dissemination should be systematically undertaken.

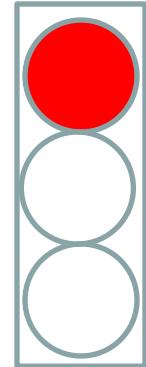
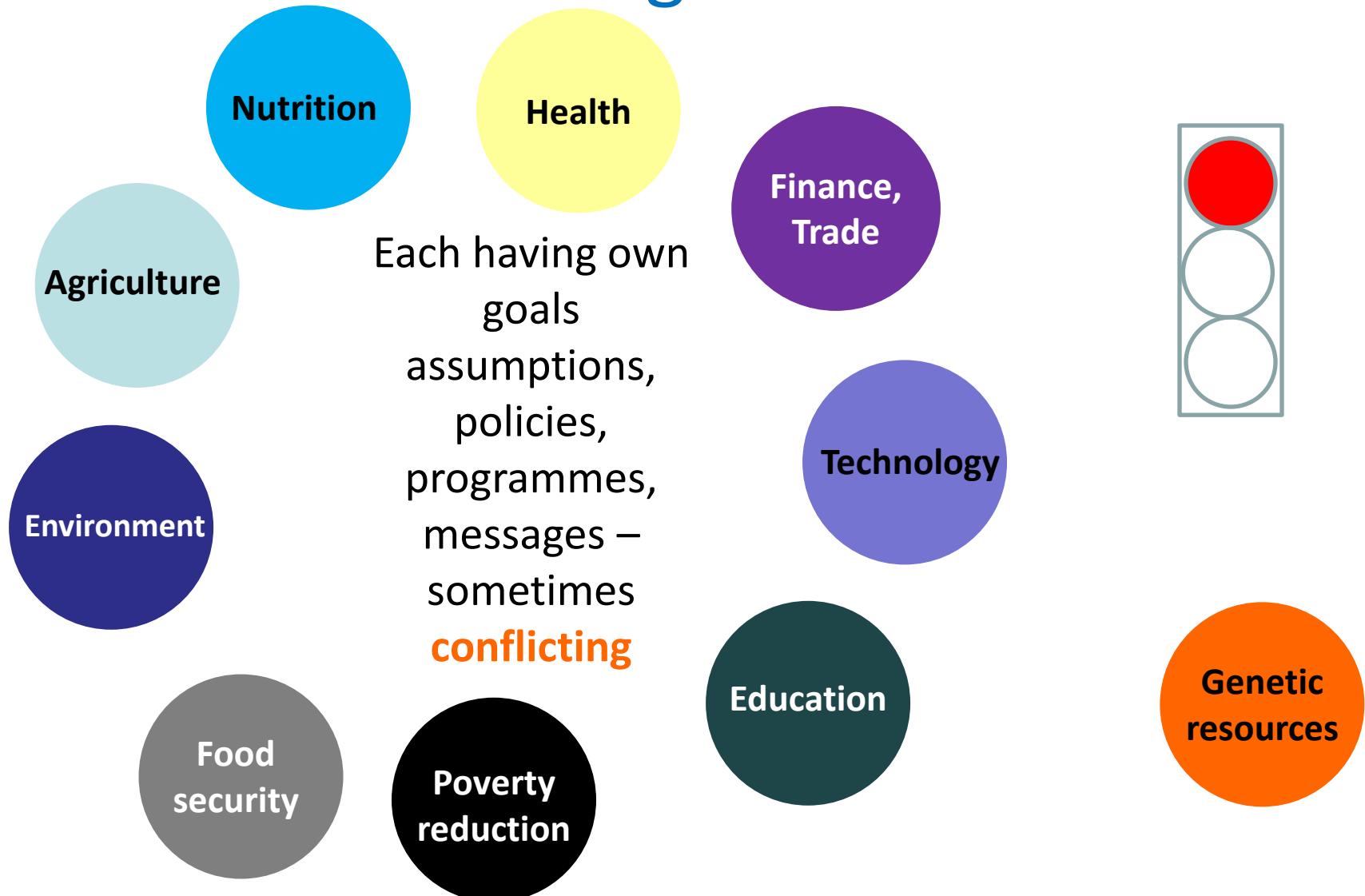
FAO (2002). Report of the International Rice Commission 20th Session (23-26 July 2002, Bangkok). FAO, Rome.



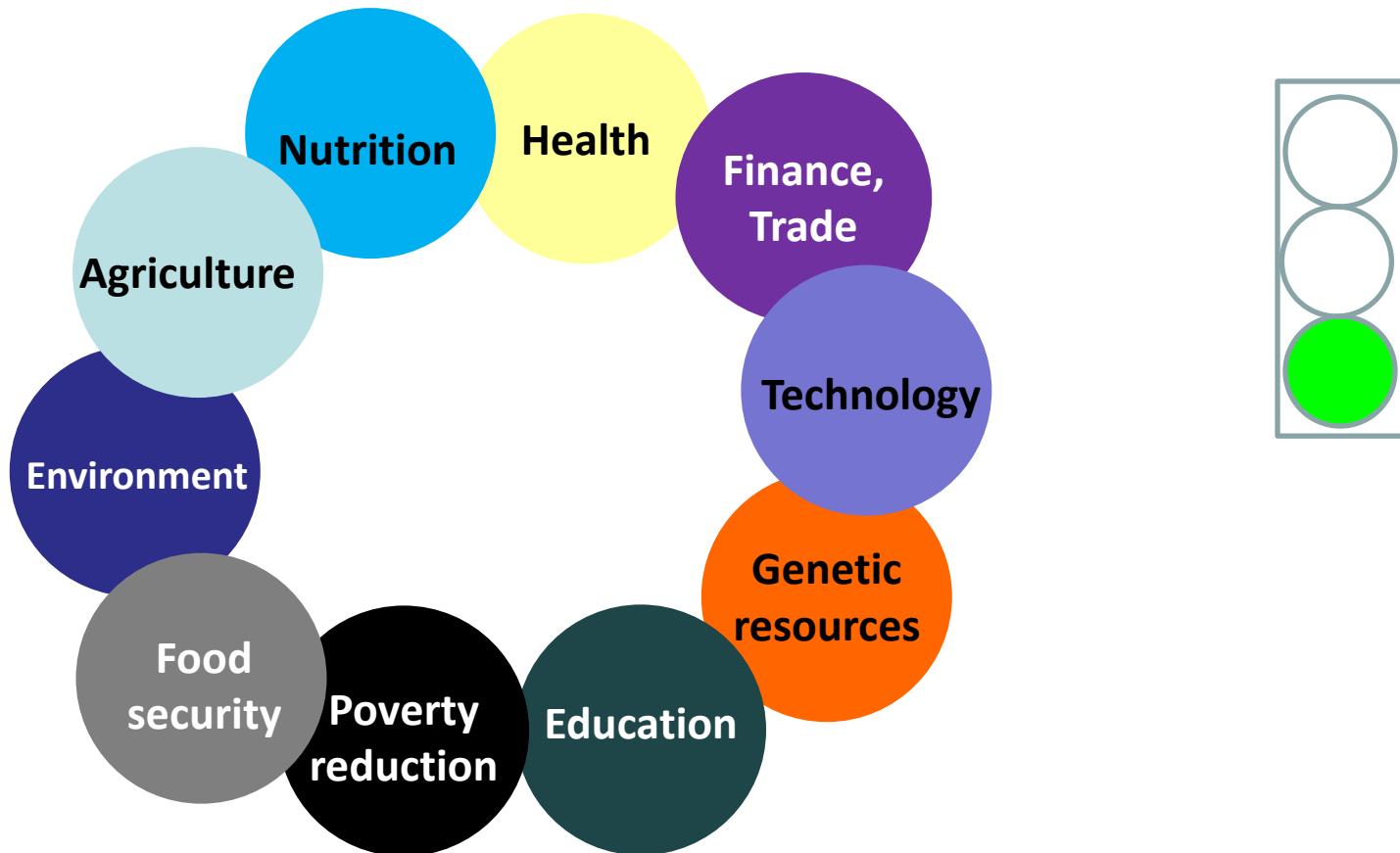
## Better nutrition, food security and income generation



# No mainstreaming of nutrition or GR



# Mainstreaming of nutrition and GR



**Common and coherent** goals, assumptions, policies, programmes, messages to achieve better **food-based** nutrition through using existing GR, especially for micronutrients.

# CGRFA-15/15/6 Biodiversity and Nutrition

## Draft Guidelines for Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition:

- **Rational** – why the guidelines are important
- **Objectives** – assist countries in mainstreaming GF
- **Principles** – including element for planning
- **Three main elements**
  - **Research** – describe knowledge gap and way forward
  - **Implementation** – describe important components
  - **Awareness** – describe how to raise awareness of the general public and of the different stakeholders



# Summary

- Biodiversity and genetic resources can improve nutrition, health and food security based on **foods**.
- Biodiversity and genetic resources can make the difference between nutritional adequacy and inadequacy and professionals and consumers need to know more about it.
- Agriculture production and breeding should include nutritional objectives.
- The more biodiversity and diverse diets are consumed the lower the need for fortification and supplementation.
- Many policies and programmes need to include GR and nutritional goals and be coherent across sectors.

