



# **Nutrition and Biodiversity: a common path**

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**FAO**

# The Commission on Genetic Resources

- FAO provide Secretariat
- Since 1983
- 168 governments, including Armenia
- Mandate for all biological diversity
- Two main subsidiary bodies
  - Intergovernmental Working Group on Plant Genetic Resources
  - Intergovernmental Working Group on Animal Genetic Resources



The Treaty



# International Treaty on Plant Genetic Resources for Food and Agriculture

- Adopted by the FAO Conference in November 2001
- Came into force 29 June 2004
- “First important treaty of the millennium”
- Keystone to achieving the MDGs
- 106 parties to the Treaty, including Armenia
- Commission reports to the governing body of the Treaty

# Intergovernmental Working Group on Plant Genetic Resources

- Provide guidance on how to best support countries, on request, to generate, compile and disseminate cultivar-specific nutrient composition data\*, as well as indicate the relative priority of obtaining cultivar-specific dietary consumption data, in order to demonstrate the role of biodiversity in nutrition and food security.

\*Includes conventional nutrients, bioactive non-nutrients (phytochemicals, antioxidants, etc.), and contaminants



# Conference of the Parties

- Decision VII/32 (Kuala Lumpur, Malaysia, February 2004)
  - **Noting** the linkage between biodiversity, food and nutrition...
  - **Requests**...FAO and IPGRI...to undertake...a **cross-cutting initiative on biodiversity for food and nutrition** to work together with relevant organizations, in order to strengthen existing initiatives on food and nutrition, enhance synergies and fully integrate biodiversity concerns into their work, with a view to the achievement of...relevant Millennium Development Goals.
- Decision VIII/23A (Curitiba, Brazil, March 2006)
  - **Adopts** the framework for a cross-cutting initiative on biodiversity for food and nutrition.

# Millennium Development Goals



## Goal 1. Eradicate extreme poverty and hunger

- Reduce by half the proportion of people who suffer from hunger

## Goal 7. Ensure environmental sustainability

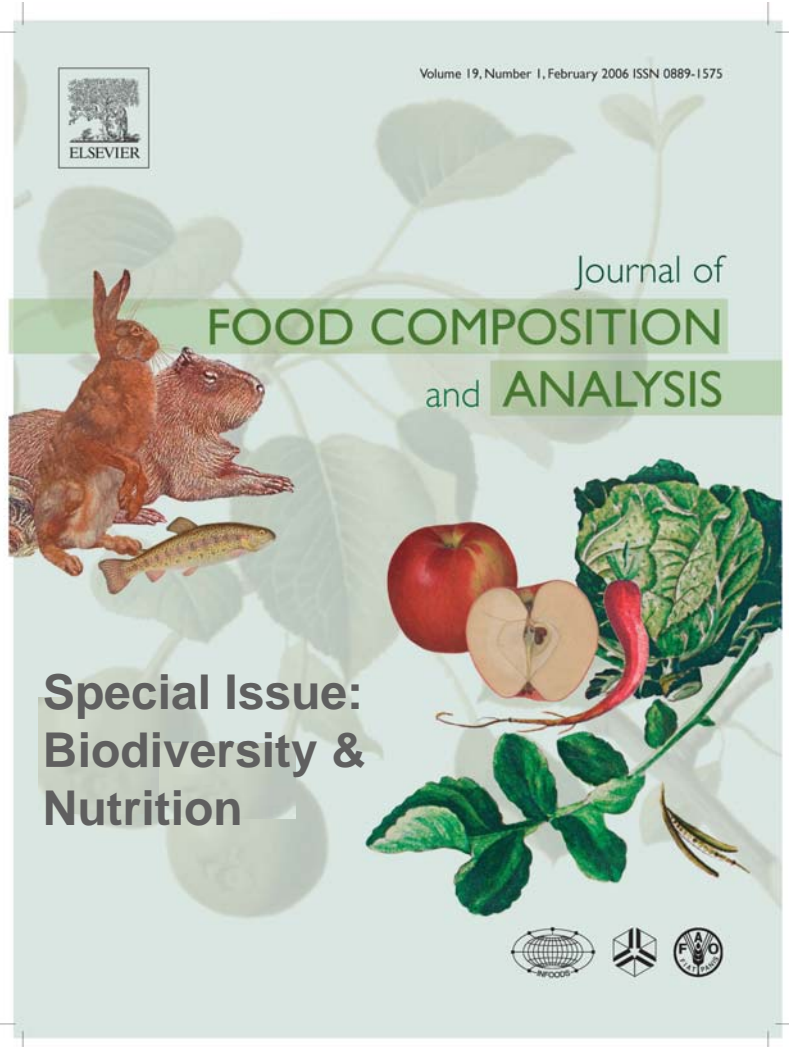
# Cross-cutting initiative on nutrition and biodiversity

- Substantiating and promoting awareness of the links between biodiversity, food and nutrition
- Compilation, review and analysis of existing scientific information, indigenous and traditional knowledge (in a manner consistent with the CBD, Article 8(j)), and case studies;
- Development of a communication strategy, and associated publications and other materials to address: the general public (including the promotion of local varieties, crops and food products in the popular media); decision makers; local communities; and the nutrition, agriculture, health and environment communities;
- Convening of regional advocacy and policy workshops.

# Rationale

- Wild species and intraspecies biodiversity have key roles in global food security
- Different varieties have statistically different nutrient + contents
- Acquiring nutrient + data on existing biodiversity needs to be a prerequisite for decision-making in GMO work
- Nutrient + content needs to be among criteria in cultivar promotion
- Sample and generate nutrient + data for wild foods and cultivars
- Compile these data systematically and centrally and disseminate widely
- Include biodiversity questions and/or prompts in food consumption surveys
- Acquiring nutrient + data and intake data for varieties is essential in order to understand the impact of biodiversity on food security

# Improving the evidence base



- **Biodiversity in local and traditional food systems**
- **New nutrient data to underpin the sustainable use of plant genetic resources for food and agriculture**
- **Diversity of fruits, nuts and their products for improving nutrient intakes**
- **Farm animals and fisheries diversity for human nutrition**
- **Ecosystems and nutrition: rice-based aquatic ecosystems and dietary diversity**

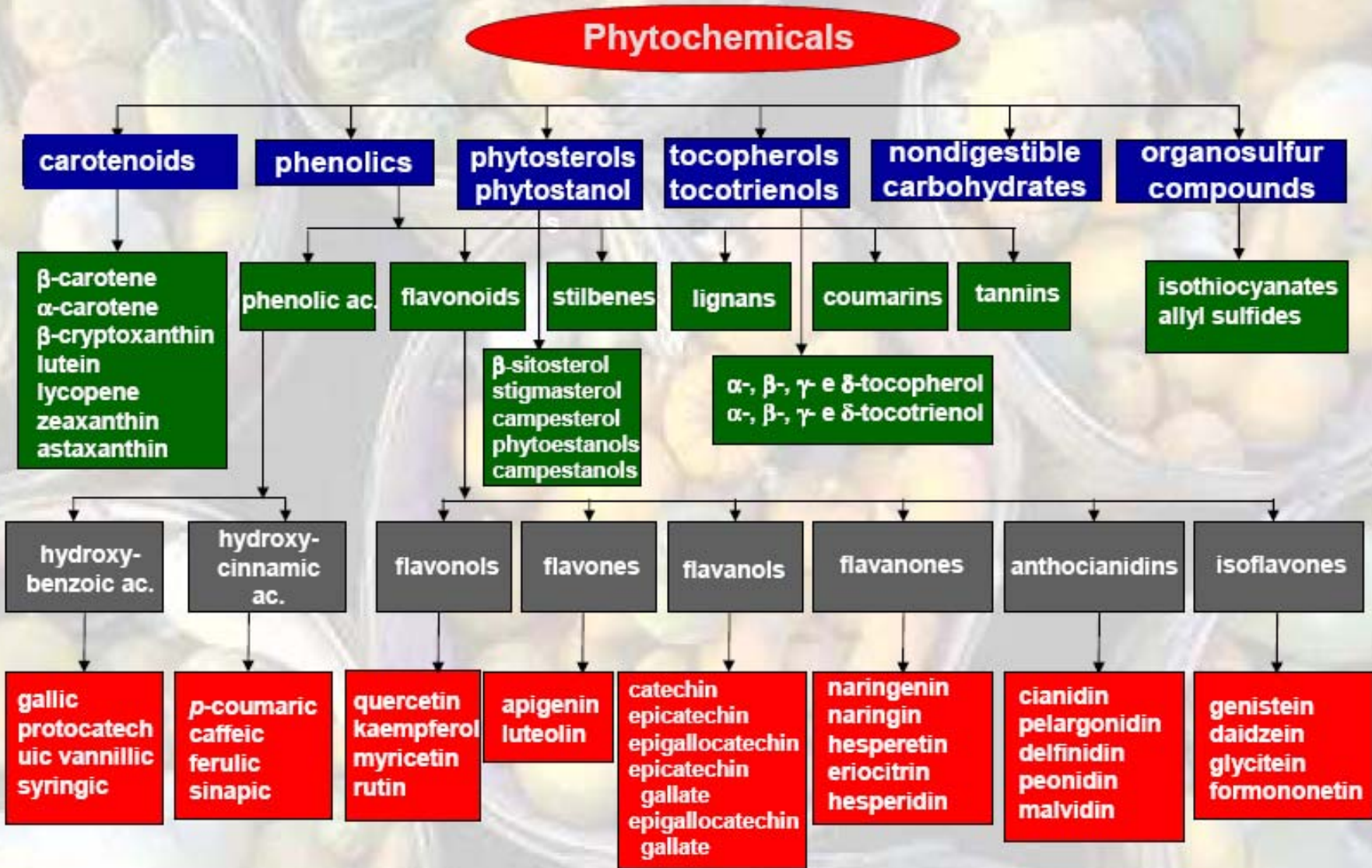


Figure 1. Principal bioactive compounds in foods of plant origin. References: Liu (2004) and Rodriguez et al. (2006).

# PRINCIPAL PHYTOCHEMICALS IN FOODS

Organosulfur  
compounds

Phytates

Flavonoids

Carotenoids

Coumarins

Terpenes

Lignans

Phenolic acids

Phytosterols

	Organosulfur compounds	Phytates	Flavonoids	Carotenoids	Coumarins	Terpenes	Lignans	Phenolic acids	Phytosterols
Garlic	•					•			
Green tea			•		•			•	
Berries			•			•		•	
Citrus			•	•	•	•		•	•
Cruciferous	•		•	•	•	•		•	•
Cereal grains		•	•	•	•	•		•	•
Flaxseed			•		•		•	•	
Soybean		•	•		•	•	•	•	•
Tomato			•	•				•	•
Wine			•					•	

Reference: Rodriguez et al. (2006)

# FUNCTIONS OR ACTIONS OF SOME PHYTOCHEMICALS AGAINST DISEASES

*Anti-carcinogenic*  
*Anti-microbial*  
*Antioxidative*  
*Anti-thrombotic*  
*Immunity-supporting*  
*Anti-inflammatory*  
*Blood pressure influencing*  
*Cholesterol-lowering*  
*Blood sugar influencing*

Carotenoids	•		•		•				
Phytosterols	•							•	
Saponins	•	•			•			•	
Glucosinolates	•	•						•	
Polyphenols	•	•	•	•	•	•	•		•
Sulfides	•	•	•	•	•	•	•	•	
Monoterpenes	•	•							
Phytoestrogens	•		•						

Reference: Shreiner (2005).

# Functional Foods & Nutraceuticals

Anti-cancer, antiviral,  
neuroprotective, anti-  
aging, anti-  
inflammatory, life-  
prolonging, sleep-  
improving...

Make you smart, calm,  
energetic, alert...

Decrease risk for heart  
disease, diabetes,  
atherosclerosis,  
osteoporosis...



# Apricots

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Database	$\mu\text{g}$ $\beta$ -Carotene Equiv.
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USDA (09021)	1566
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British (860 5th ed.)	405
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Australian (06C1-002)	208
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New Zealand (L19)	6939
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German (Pg 746-749)	1790
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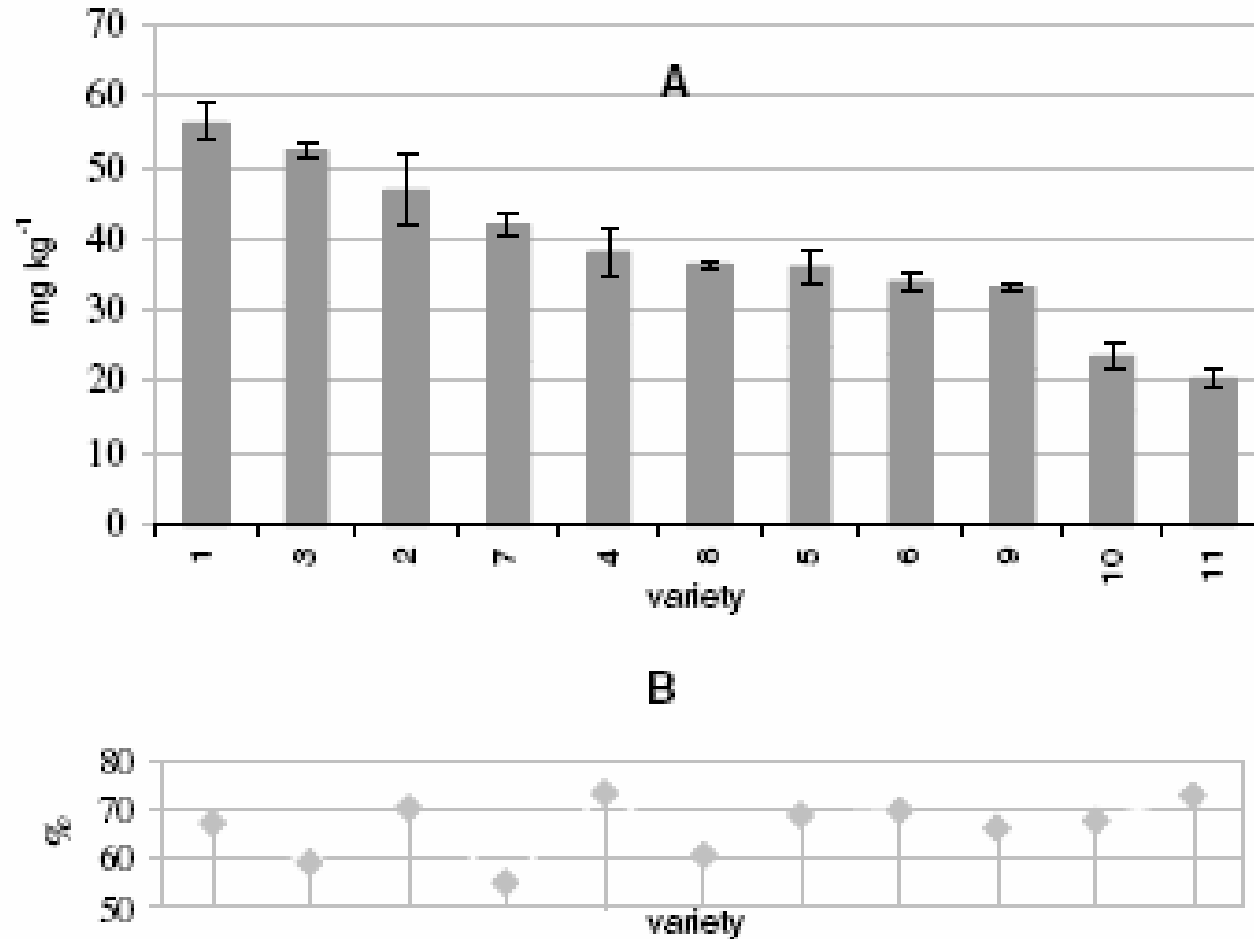


**Total phenolics 32.6 and 160.0 mg 100 g<sup>-1</sup> of edible tissue**

# Food Biodiversity

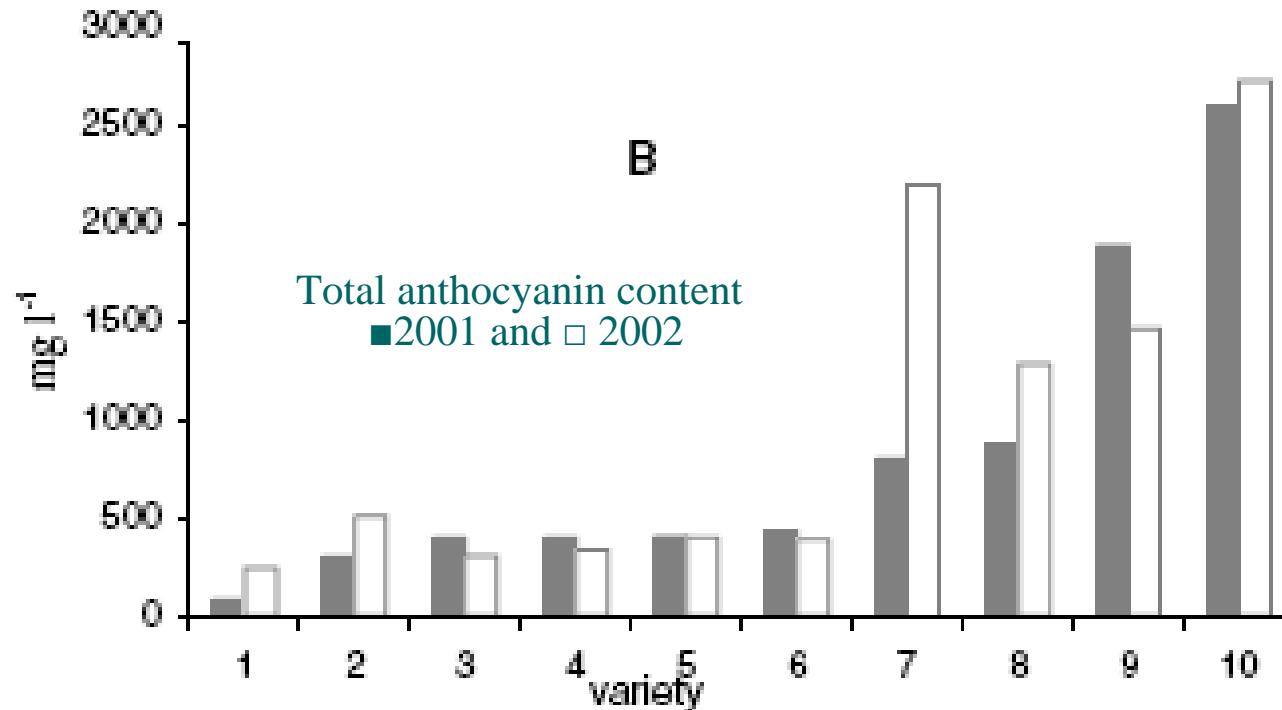
	Resource	Nutrient
<b>Wheat, cultivated and wild</b>	<i>Triticum</i> four species 106 varieties	Protein, amino acids, B-vitamins, vitamin E, fatty acids
<b>Apricots</b>	<i>Prunus armeniaca</i> , more than 140 varieties	$\beta$ -carotene, lutein, lycopene, anthocyanins, vitamin C
<b>Grapes</b>	<i>Vitis</i> two species ( <i>vinifera</i> and <i>sylvestris</i> ) hundreds of varieties	Vitamin C, organic acids, anthocyanins, resveratrol, many phytochemicals

# Variability of carotenoid content in apricot varieties



(A) Content of total carotenoids, 20-57, (B) Ratio of  $\beta$ -carotene to other carotenoids 55-75%

# Variability of anthocyanin content of sour cherry cultivars



- In half of the samples total anthocyanins was around 400 mg/l, while three of the varieties contained 4–5 times more.
- There was no significant difference in total anthocyanin content in the 60% of varieties analysed in two different years.
- In the 40% of varieties anthocyanin content increased in 2002 where anthocyanin content was 1.5–3.2-fold higher, respectively, in 2002 than that in 2001.



TWENTY-FOURTH FAO REGIONAL CONFERENCE FOR EUROPE  
MONTPELLIER, FRANCE, 5-7 MAY 2004  
FOOD SAFETY AND QUALITY IN EUROPE:  
ASPECTS CONCERNING IN PARTICULAR QUALITY, NUTRITIONAL  
BALANCE, THE IMPORTANCE OF AGRICULTURAL LAND AND  
CULTURAL HERITAGE ("TERROIRS")

... food quality is not limited to safety. Other dimensions need to be considered and particular attention could be usefully placed on the following two aspects:

- assurances of organoleptic and nutritional characteristics in relation to food processing; and
- enhancement of quality associated with production area and its cultural dimensions.

# Mainstreaming



- Systematic integration of biodiversity into nutrition (intake surveys, food composition tables and databases, general conferences)
- Systematic integration of nutrition into biodiversity activities
- Integrate elements into all sectors
  - Health, agriculture, environment, tourism
- Promote food biodiversity domestically and in export markets
- Consider nutrients+ in decision-making
- Develop sustainability in production, wild and cultivated
- Improve QA / QC
- Publication beyond the grey literature
- Market uniqueness

# Brasilia recommendations

Mainstreaming the conservation and sustainable use of biodiversity into agendas and programmes related to nutrition and agriculture, and poverty reduction. For example, integrate biodiversity into programmes and activities concerning:

- Food-based dietary guidelines;
- Food composition analysis and dietary assessments;
- Nutrition education;
- Relevant regulatory frameworks and legislation at national and international levels;
- National Plans of Action for Nutrition;
- National Poverty Reduction Strategy Papers;
- The Right to Food;
- Food security projects and programmes, including: household food security projects, school programmes, home gardens;
- Emergency response and preparedness.

# Biodiversity and nutrition

- Dietary energy supply *can* be satisfied without diversity
- Micronutrient supply *cannot* be satisfied without diversity

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*“Agricultural biodiversity is a matter of life and death for us.... We cannot separate agrobiodiversity from food security.”*

*—Zambian delegate to the Conference of Parties,  
Convention on Biological Diversity, May 1998*

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