

Nutrition Indicator for Biodiversity *Food Composition*

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Definition Biodiversity

Biodiversity exists at three levels

- **The ecosystem**
- **The species in the ecosystem**
- **The varieties within species**



Nutrition indicators for biodiversity - objectives

- To monitor biodiversity over time by measuring the composition and consumption of food and medicinal plant and animal genetic resources
- To encourage researchers to generate and compile more food consumption and compositional data for food biodiversity
- To enable more research on food biodiversity and nutrition and health
- To raise awareness of the population, researchers and governments on food biodiversity and their impact on dietary adequacy
- To understand the impact of food biodiversity on food security



Biodiversity & Nutrition Rationale

- Wild species and intraspecies biodiversity have key roles in global food security
- Different varieties have statistically different nutrient contents
- Nutrient content needs to be among criteria in cultivar promotion
- Knowledge on nutrient data on existing biodiversity needs to be a prerequisite for decision-making in GMO work
- Knowledge on nutrient data and intake data of varieties is essential in order to understand the impact of biodiversity on food security
- investigate and disseminate the nutrient and non-nutrient composition of wild foods and of foods at cultivar level
- include biodiversity questions and/or prompts in food consumption surveys



Links between biodiversity, food and nutrition recognized by

- Convention on Biological Diversity (CBD)
- Conference of the Parties of CBD: Decision VII/32
- Millennium Development Goals (MDG)
- Cross-cutting initiative on biodiversity for food and nutrition (IBFN)
- Intergovernmental Working Group on Plant Genetic Resources
- International Rice Commission



| Schema | Plant – example | Plant – example | Fish - example | Animal – example |
|------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------|
| Family | <i>Rosaceae</i> – Rose family | <i>Poaceae</i> – Grass family | <i>Pleuronectidae</i> | <i>Bovidae</i> <i>Caprinae</i> |
| Genus | <i>Prunus</i> L. – plum | <i>Triticum</i> L. – wheat | <i>Platichthys</i> | <i>Ovis</i> |
| Species | <i>Prunus domestica</i> L. – European plum | <i>Triticum aestivum</i> L. – common wheat | <i>Platichthys flesus</i> (Linnaeus, 1758) | <i>Ovis aries</i> – sheep |
| Subspecies | <i>Prunus domestica</i> L. subsp. <i>domestica</i> | | | (rarely used) |
| Variety Cultivar Breed | <i>Prunus domestica</i> L. var. <i>domestica</i> – European plum <i>Prunus domestica</i> ‘Cacak’s Beauty’ | <i>Triticum aestivum</i> ‘Pioneer 2163’ | <i>Platichthys flesus</i> var. <i>marmorata</i> Nordmann, 1840 - European flounder | Suffolk |



Food Biodiversity

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



Differences in food composition

| | Protein g | Fibre g | Iron mg | Vitamin C mg | Beta-Carotenes mcg |
|--------------|---------------|------------|--------------|--------------------|----------------------------------------|
| Rice | 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 | 0.6-1.4 | 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 | 200-6939 (beta carotene equivalent) |
| Banana | | | 0.1-1.6 | 2.5-17.5 | <1 - 8500 |



Developing and Using Local Food Posters: Food Composition Data and Health Messages

POHNPEI BANANAS (UHT KAN EN POHNPEI): CAROTENOID-RICH VARIETIES

Grow and eat orange- and yellow-fleshed varieties for your health to help protect against diabetes, heart disease, certain cancers, vitamin A deficiency, and anemia.

Padok oh sakan soangen uht kan me oangoahng preehn sewese omwi rosont: soumwahu en sake, soumwahu en mochingong, cancers, seutar en vitamin A, oh seutar en nia.

Kisin mwengehn Pohnpei kan me kolokol "Vitamin A" laud Pohnpei Carotenoid-Rich Foods

Grow and eat yellow varieties to help protect against:

Rice 0 µg

Poadukidi oh kang kisin mwengehn pohn oangoahng kan pree eni sewese preehodi:

Sweet potato varieties: α - and β -carotene, mg/100g fresh wt

| Variety | %Moisture | β -carotene | α -carotene |
|---------------------------|------------|-------------------|--------------------|
| <i>Orange Flesh</i> | | | |
| Excel | 77.8 (0.8) | 12.8 (0.1) | < 0.1 |
| Kona B # | 77.8 (0.6) | 6.7 (0.2) | 1.5 (0.2) |
| Regal | 77.2 (2.1) | 13.1 (0.7) | < 0.1 |
| UH 71-5 # | 70.3 (1.1) | 8.0 (0.1) | < 0.1 |
| <i>Yellow/White Flesh</i> | | | |
| Hoolehua Red # | 70.4 (2.7) | 0.2 (0.1) | < 0.1 |
| Satsuma # | 68.3 (0.2) | 0.6 (0.1) | < 0.1 |

n=6, values in parentheses are standard errors. # Varieties are recommended by the University of Hawaii Extension Service for good yield and disease resistance. Source: A. S. Huang, L. Tanudjaja, D. Lum. Journal of Food Composition and Analysis, Vol. 12, No. 2, Jun 1999, pp. 147-151.

Nutrition indicator for biodiversity

1. Food composition

Development

- Expert consultation held in conjunction with the 7th International Food Data Conference
- 21 October 2007, São Paulo, Brazil
- 16 experts from 13 countries
- Tasks to define and develop indicator; identify data sources, gaps, reporting mechanism
- Consensus reached
- Report published, print and web, in three languages* and disseminated through FAO, Bioversity, INFOODS Regional/National Data Centres, international conferences and the Journal of Food Composition and Analysis.

Status

- Data are generally published in the international, peer-reviewed scientific literature
- Baseline data collected in late 2007/early 2008
- First year data collection and reporting in late 2008
- Second year data collection underway for reporting in late 2009
- Build up the database
- Ultimate goal: Conservation and sustainable use of food genetic resources



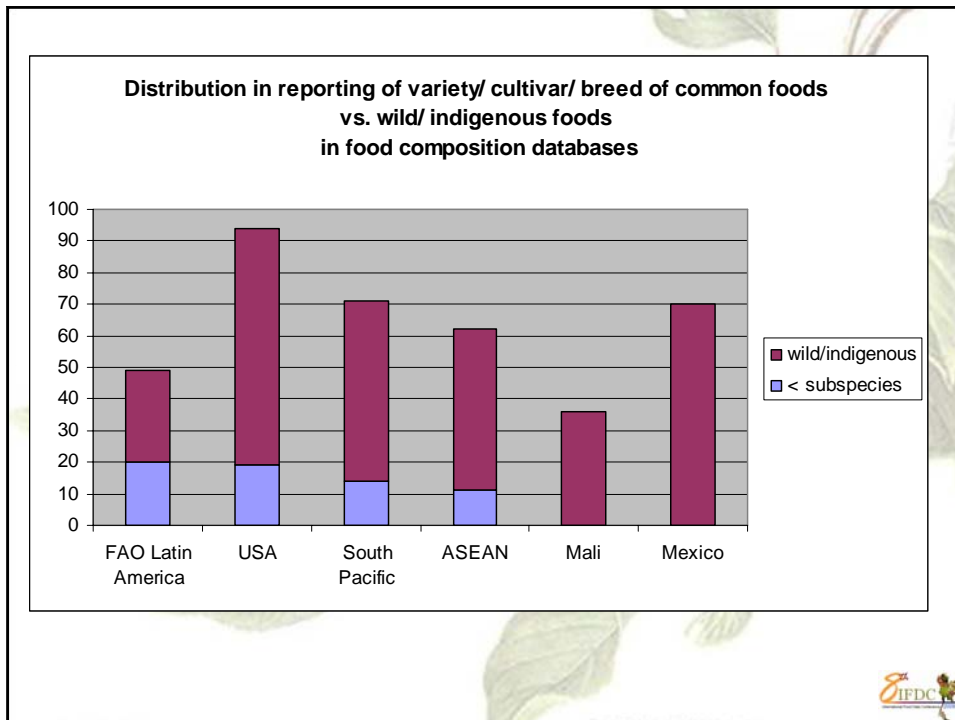
Nutrition indicators for biodiversity

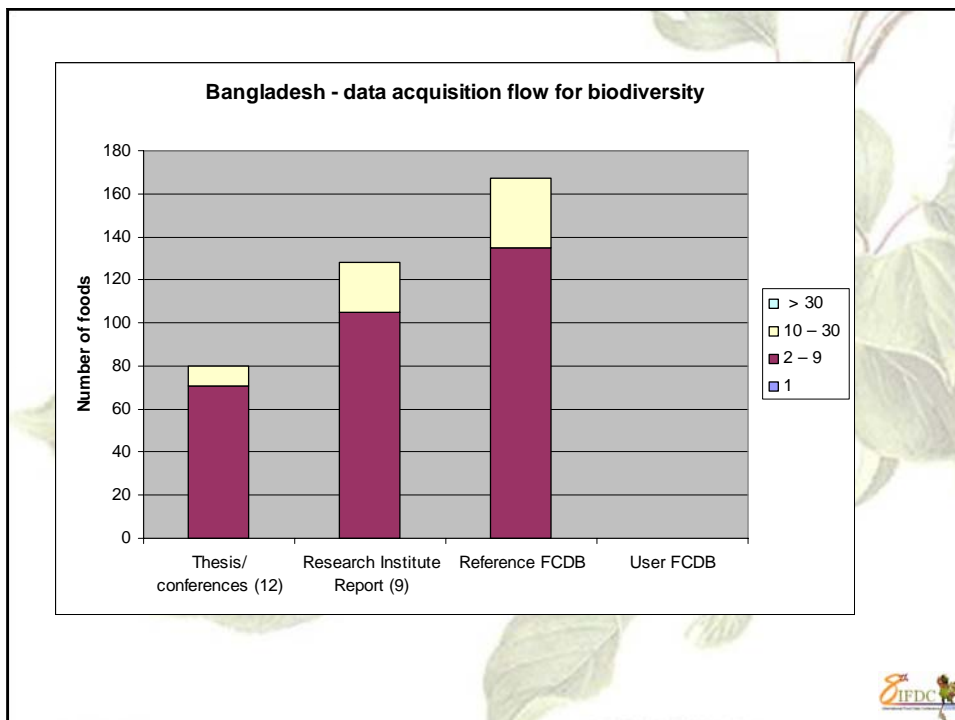
1. Food composition (2007)

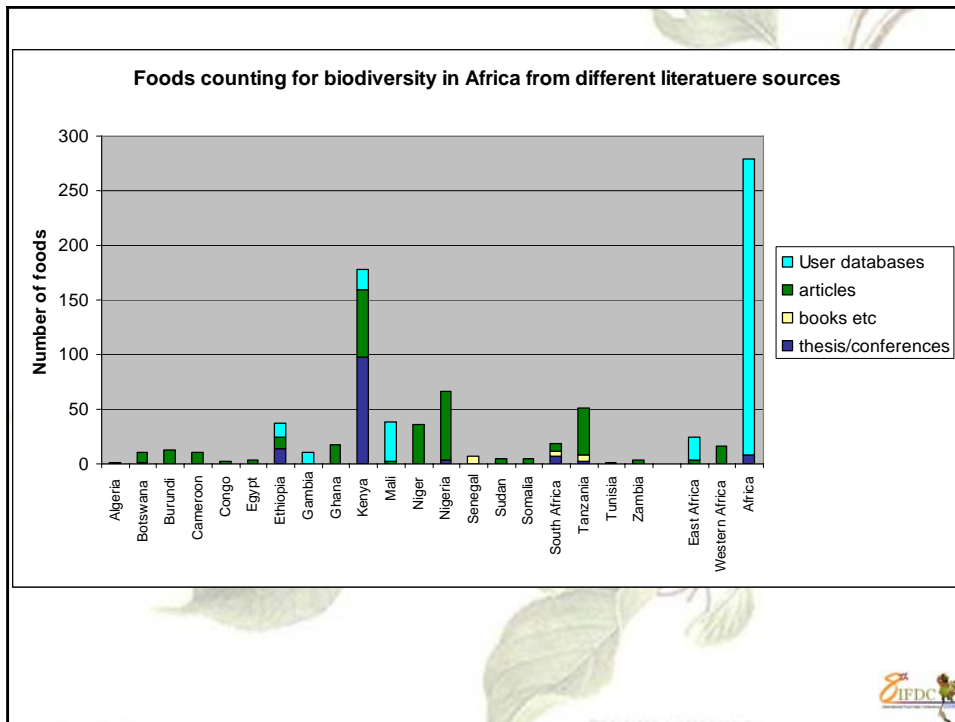
It counts the number of foods

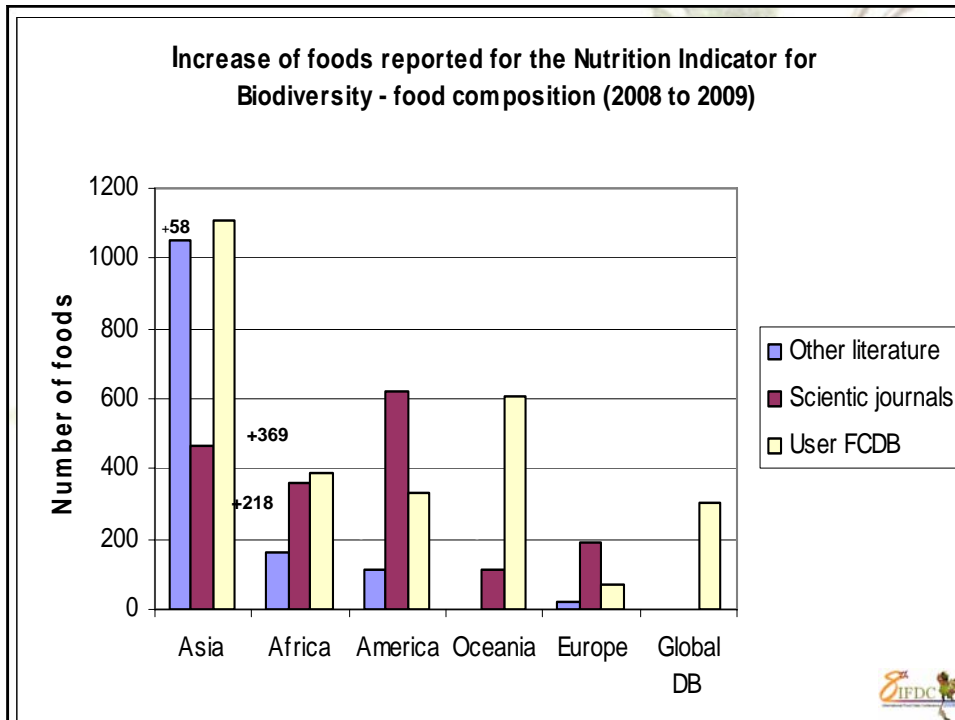
- at variety/ cultivar/ breed level for common foods
- species level for wild/ indigenous/ underutilized foods
- with at least one value for component
- Several information sources identified
- Reporting mechanism: INFOODS Regional Data Centres
- Baseline collected in 2008 and for 2009

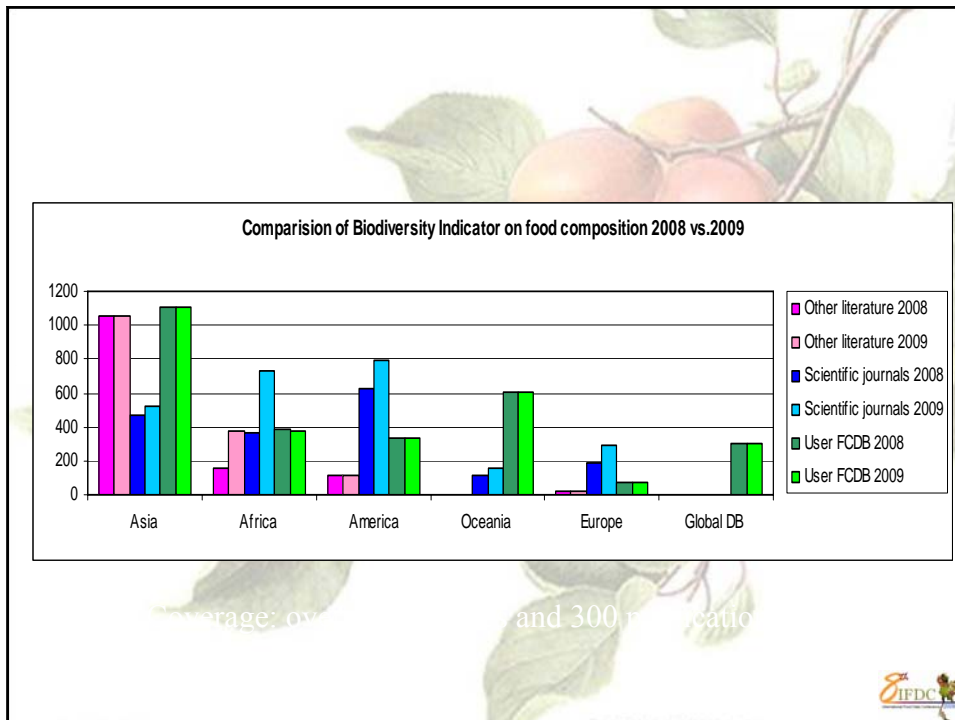


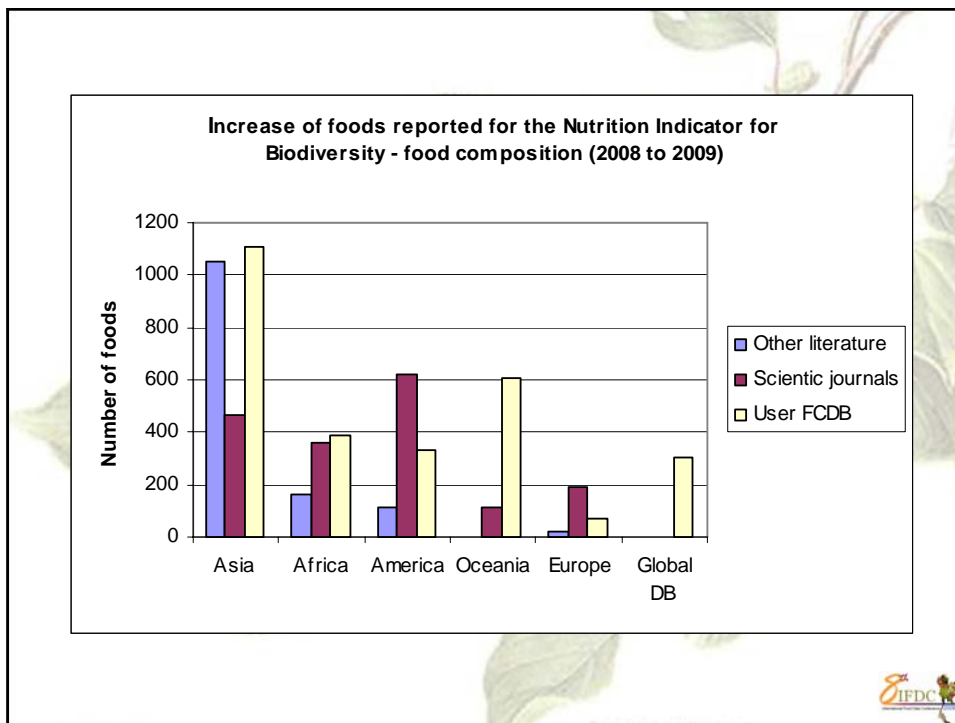












Nutrition indicator for biodiversity

2. Food consumption

Development

- Expert consultation held in conjunction with the 7th International Conference on Diet and Activity Methods
- 8-9 June 2009, Washington
- 12 experts from 8 countries
- Tasks to define and develop indicator; identify data sources, gaps, reporting mechanism
- Consensus reached
- Report will be published, print and web, in three languages* in late 2009.

Status

- Collect baseline data (2009)
- Collect first year data (2010)
- Submit first annual report (2010)
- Build up the database
- Develop guidelines to modify and field-test existing food consumption instruments
- Continue to report annually through a variety of fora



Nutrition indicator for biodiversity

2. Food consumption (2009)

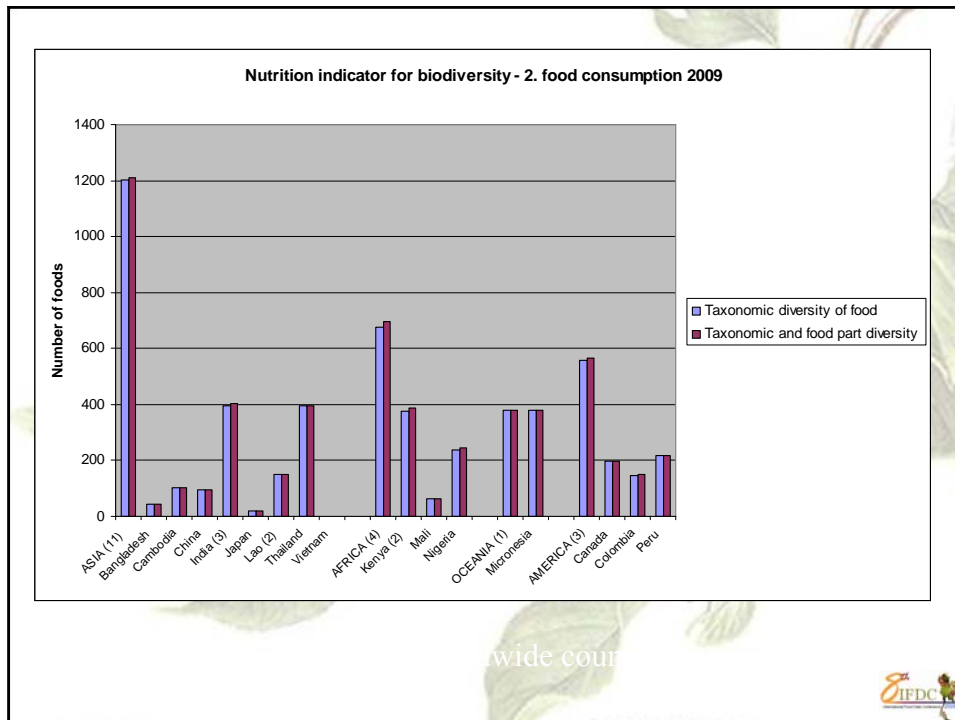
Count:

- number of surveys with at least one reported food counting for biodiversity;
- total number of foods consumed counting for biodiversity (caution for double counting of foods). Definition of foods is similar as for food composition

Reported with additional information:

- Study (scope, date, number and description of subjects, geographical/ethnic coverage, instrument used; reference, total number of studies examined)
- Food (number of foods reported, food list)





Biodiversity & Nutrition – implications

For food composition database compilers:

- Sample and generate nutrient data for wild foods and individual cultivars, also by ecosystem
- Compile these data comprehensively, systematically and centrally, and disseminate widely

For food consumption surveys

- Include biodiversity questions and/or prompts in food consumption surveys
- Report food consumption also by ecosystem and/or ethnic group
- Communicate to food composition database compilers the need for compositional data for these specific foods

For nutrition education

- Investigate traditional foods and varieties
- Promote the most nutritious among them

For agriculture policies and programmes

- Nutrient content needs to be among criteria in promoting food biodiversity

Increase the evidence base

- Scientific data on composition
 - Compilation into food composition databases
 - Journal of Food Composition and Analysis
 - Strengthening laboratory capacity
- Consumption survey instruments
 - Modifying existing instruments
 - FFQ, 24h recall, diet history
 - Field testing, innovative
- Communication and reporting
 - Presentation at international conferences and fora
 - develop indicators on biodiversity and nutrition (food composition, food consumption) and report on it
 - publish scientific papers



Conclusions

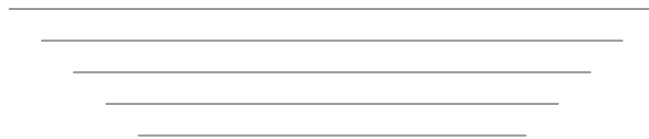
Compositional data for food biodiversity...

- assist the agriculture sector to grow more nutritious varieties
- open new markets for these nutritious varieties
- contribute to sensible policy and programs for food aid and food fortification
- provide consumers with more information to obtain their nutrient requirements from food
- assist to conserve the biodiversity of our planet
- ➔ Contribute to nutrition, health and food security
- ➔ Contribute to preparedness to effects of climate change



More information ...

- INFOODS webpage on biodiversity
http://www.fao.org/infoods/biodiversity/index_en.stm
 - Treaties and conventions
 - Expert consultation reports
 - Books
 - Documents
 - Posters
 - link to JFCA supplement *Biodiversity and Nutrition: a common path*
- Bioversity International webpage on biodiversity and nutrition
<http://www.bioversityinternational.org/Themes/Nutrition/index.asp>



8th International Food Data Conference

October 1-3, 2009

Bangkok, Thailand