Expert Consultation on Nutrition Indicators for Biodiversity

2. Food consumption

2010 International Year of Biodiversity

INFOODS

Bioversity International

FAO FIAT PANIS

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 2010

ISBN 978-92-5-106731-4

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FOREWORD

Presenting nutrition and biodiversity as a single issue is one of the main rationales of the Cross-Cutting Initiative on Biodiversity for Food and Nutrition, which is led by Food and Agriculture Organization of the United Nations (FAO) in collaboration with Bioversity International. The overall aim of this initiative is to promote the sustainable use of biodiversity in programmes contributing to food security and human nutrition, and thereby raise awareness of the importance of this link for sustainable development.

The Convention on Biological Diversity (CBD) has proposed a suite of indicators to measure progress towards its 2010 biodiversity targets. Support to the delivery of the indicators is being provided by the 2010 Biodiversity Indicators Partnership (2010 BIP), a group of more than 40 international agencies coordinated by the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP–WCMC). It was within this framework and through this support that FAO held an expert consultation for the development of the second nutrition indicator for biodiversity and food consumption. This second indicator is the complement to the first nutrition indicator on biodiversity and food composition. The development of indicators, tools and methodologies to measure and monitor biodiversity-related food composition and food consumption is critical in promoting sustainable diets.

Several new and ongoing projects in FAO, with the collaboration of the UNEP and Bioversity International, highlight the usefulness and importance of the two indicators. The projects aim at mainstreaming biodiversity into national and global agriculture, nutrition, and health policies and programmes. They will address the unique biological diversity that supports a large share of the world's food supply in a range of ecosystems that are global priorities for conservation.

Three fundamental components of the projects are: (i) expanding the knowledge base on the nutritional benefits derived from agricultural biodiversity; (ii) establishing regulatory frameworks and integrating multisectoral policies for mainstreaming biodiversity across environment, health, agriculture and development activities; and (iii) increasing awareness at all levels of the importance of food biodiversity for nutrition, food security, and environmental sustainability. The two nutrition indicators are crucial to understanding the role of biodiversity for food and nutrition, in pursuit of the ultimate goal of the conservation and sustainable use of biodiversity for food and nutrition.

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ACKNOWLEDGEMENTS

FAO is grateful for the very valuable contribution of the experts to the development of the Nutrition Indicator for Biodiversity related to food consumption, all of whom have collaborated in efforts toward the sustainable development and use of biodiversity for nutrition security. The full list of experts can be found in *Annex 1*.

Special appreciation is due to Suzanne Murphy, who served as Chairperson of the Expert Consultation, and to Lois Englberger and Keith Shawe, who served as rapporteurs.

The Consultation expresses its appreciation for the overall leadership, preparation and execution of the meeting to: Barbara Burlingame, Ute Ruth Charrondière, Marie Claude Dop and Béatrice Mouillé (FAO); Pablo Eyzaguirre (Bioversity International); Timothy Johns (McGill University); and the FAO Office in Washington, DC, especially A. Kaggwa Lubega, for their support in the administrative arrangements of the meeting. The Consultation is grateful to Giuseppina Di Felice for the layout of the report.

ACRONYMS AND ABBREVIATIONS

BIP	Biodiversity Indicators Partnership
CBD	Convention on Biological Diversity
CBD–COP	Conference of the Parties to the Convention on Biological Diversity
CINE	Centre for Indigenous Peoples' Nutrition and Environment
cv.	Cultivar (from cultivated + variety)
EPIC	European Prospective Investigation into Cancer and Nutrition
FAO	Food and Agriculture Organization of the United Nations
FFQ	Food Frequency Questionnaire
GEF	Global Environment Facility
GFU	Global Facilitation Unit
INFOODS	International Network of Food Data Systems
ICNCP	International Code of Nomenclature for Cultivated Plants
ICZN	International Commission on Zoological Nomenclature
IUNS	International Union of Nutritional Sciences
ICDAM	International Conference on Diet and Activity Methods
LARReC	Living Aquatic Resources Research Center
MDG	Millennium Development Goal
NHANES	National Health and Nutrition Examination Survey
OAA	Other Aquatic Animal
UNEP–WCMC	United Nations Environment Programme – World Conservation Monitoring Centre
UPC	Universal Product Code
UPOV	International Union for the Protection of New Varieties of Plants
var.	Variety

SUMMARY

The development of nutrition indicators for biodiversity is a collaborative international process, led by FAO together with Bioversity International and other partners. The task is part of the Cross-Cutting Initiative on Biodiversity for Food and Nutrition.

The initiative was launched on the basis of a recognized link between biodiversity, food and nutrition and the need to enhance sustainable use of food biodiversity to combat hunger and malnutrition. The Cross-Cutting Initiative on Biodiversity for Food and Nutrition was formally established in 2006 by Decision VIII/23 A of the Conference of the Parties to the Convention on Biological Diversity (CBD–COP). The development of the food consumption indicator is supported by the 2010 Biodiversity Indicators Partnership (2010 BIP), coordinated by United Nations Environment Programme – World Conservation Monitoring Centre.

An Expert Consultation was held on 8 and 9 June 2009 in Washington, DC, the United States of America, to develop the food consumption Nutrition Indicator for Biodiversity. The 12 experts from nine countries agreed on an indicator for food consumption consisting of a count in different surveys of the number of foods reported with a sufficiently detailed description of genus, species, subspecies and variety/cultivar/breed. Reporting for this indicator will also include the number of dietary assessment surveys taking biodiversity into consideration in relation to the total number of surveys examined.

Monitoring the indicator will involve examining well-documented literature, including international, regional, national, sub-national survey reports and scientific literature. Reporting will be carried out by FAO every two years. It is hoped that the number of foods reported and the number of food consumption surveys taking account of biodiversity will show a positive trend, indicating the increasing recognition of the importance of biodiversity for food and nutrition.

It is expected that these indicators will become an advocacy tool to promote awareness of the importance of food biodiversity, including wild, indigenous and traditional foods, while contributing to nutrition security and the conservation and sustainable use of food biodiversity.

1 OBJECTIVES

The overall objective of the nutrition indicators for biodiversity is to encourage the conservation and sustainable use of food biodiversity.

The specific objective of this Expert Consultation was to ***develop*** a Nutrition Indicator for Biodiversity related to food consumption; and by doing so to:

- ***identify*** existing data and data sources needed;
- ***develop*** a mechanism for reporting, which will allow FAO to monitor the indicator over time;
- ***identify*** agencies and institutes that will report to FAO on the indicator on a yearly basis;
- ***identify*** data gaps and research needs in order to improve the indicator;
- ***identify*** the dietary assessment instruments that are suitable for adaptation.

A secondary objective was to ***develop*** guidelines for adapting dietary assessment instruments to capture food biodiversity.

2 BACKGROUND

The development of nutrition indicators for biodiversity is an international collaborative process, led by the FAO together with Bioversity International and other partners. This initiative responds to an emerging global consensus that: (1) the simplification of diets, the growing incidence of chronic diseases and the raise in nutritionally-poor and energy-rich diets are linked to the neglect and decline in the use of locally-available nutritionally-rich foods (Popkin, 2006; Caballero, 2007; Damman, Eide & Kuhnlein, 2008), and that: (2) biodiversity is the source of many foods and dietary components that can reverse this unhealthy trend (Johns and Sthapit, 2004). Although considered essential for food and nutrition security through improved dietary choices and positive health impacts, it is seldom acknowledged in nutrition programmes or interventions. This is largely because of insufficient data on scientific food identification, composition, and methods for obtaining food consumption data for food biodiversity.

In 2004, the Conference of the Parties to the Convention on Biological Diversity (CBD–COP) recognized the linkages among biodiversity, food and nutrition and the need to enhance sustainable use of biodiversity to combat hunger and malnutrition, and thereby contribute to Goal 1 and 7 of the Millennium Development Goals (MDGs). The initiative on biodiversity for food and nutrition was formally established by decision VIII/23 A of the Conference of the Parties in March 2006. During this same period, the Commission on Genetic Resources for Food and Agriculture (10th session) requested the

Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture to "provide guidance to FAO on how it could best support countries, on request, to ... indicate the relative priority of obtaining cultivar-specific dietary consumption data, in order to demonstrate the role of biodiversity in nutrition and food security."

The consumption of different varieties and breeds within a species may have a significant impact on nutritional adequacy, as considerable differences in nutrient composition have been found among varieties of the same crops (Burlingame, Charrondière & Mouillé, 2009). These studies showed a wide variability in nutrient levels among varieties and cultivars of the same species, demonstrating that the intake of one rather than another could represent the difference between nutrient deficiency and adequacy.

Biodiversity is reflected at three levels: the ecosystem or agro-ecological zone, the species contained in the ecosystem, and the genetic diversity within the species.

Many dietary assessment methods and instruments are capable of capturing food intakes at all these levels. However, few national or regional consumption surveys investigate or report food intakes at the cultivar/variety/breed level.

Food consumption data on wild, underutilized, indigenous and traditional plant and animal foods are limited and fragmented (Ogle, 2001; Krahn, 2005; Batawila *et al*., 2007; Kuhnlein, Erasmus & Spigelski, 2009; Englberger *et al*., 2009a; Roche *et al*., 2007). Dietary surveys seldom attempt to collect intake information on these species or varieties, partly because: (i) dietary assessment instruments have been developed to capture the usual or habitual intakes of foods as reported by subjects rather than detailed information on specific varieties of the foods consumed; (ii) the corresponding compositional data are rarely available; and (iii) it is widely believed that survey participants are not able to recognize foods below species level. However, recent research suggests that this is not the case. A survey in Bangladesh has shown that more than 80 percent of households were able to identify rice by cultivar and 38 different cultivars were named (Kennedy *et al.*, 2005).

As the importance of food biodiversity becomes increasingly acknowledged, more research should be undertaken to study the consumption and composition of these foods. There are a limited number of studies linking biodiversity, nutrition and health. It is therefore necessary to develop research projects to analyse the composition of wild, underutilized, indigenous and traditional foods, to compile these data into accessible databases and to collect more consumption data on food biodiversity (FAO, 2005; Frison *et al.*, 2006).

Thus, in order to monitor biodiversity and nutrition, at least two indicators are needed: one on food composition and one on food consumption. In October 2007, FAO, together with Bioversity International, held an Expert Consultation and developed the Nutrition Indicator for Biodiversity on food composition. The food composition indicator was defined as a count of the number of foods with a sufficiently-detailed description to identify genus, species, subspecies and variety/cultivar/breed, and with at least one value for a nutrient or a bioactive component (FAO, 2008a). This indicator (Indicator 1) encourages the generation, compilation and dissemination of compositional data on food biodiversity, i.e., at variety/cultivar/breed level.

The present Expert Consultation developed the second Nutrition Indicator for Biodiversity on food consumption (in this and subsequent documents to be referred to as “Indicator 2”), which addresses nutrition and other fields such as agriculture, health and trade.

3 DECLARATION OF INTEREST

All experts submitted declarations of interest; none was considered to have a conflict.

4 THE INDICATOR

4.1 Definition of Indicator 2

Indicator 2 is a count of the number of foods reported in a survey and meeting the criteria described below.

A secondary survey indicator was also developed and is a count of the number of food consumption surveys and similar surveys (as listed in *Annex 3*) taking biodiversity into consideration in their design and/or reporting, with at least one reported food meeting the criteria for Indicator 2. It should be reported in relation to the total number of surveys examined.

4.2 Food Level

As defined for the Nutrition Indicator for Biodiversity on food composition, Indicator 2 also requires that foods are described at the genus, species and subspecies level and below. When different parts or stages of maturation of the same plant or animal are consumed, they should be counted separately; for example, the root and leaf, larva and adult animal, egg and bird, meat and

milk, muscle meat and organ meat, ripe or unripe. No minimum amount or frequency of consumption is required.

Taxonomy is fluid and there is disagreement among taxonomic authorities at all levels of classification; non-taxonomists often use taxonomic terms inappropriately. Therefore, collaboration with botanists and zoologists will be needed for better food identification. In addition, genetic identification techniques or gene banks can be useful as they provide a more standardized identification. Hence, it is important to gather additional information on food identity, e.g., local names, specimens, photographs and accurate descriptions.

It was recognized that, in some cases, identification with scientific names at subspecies level and below and sometimes even at species level is difficult. For many wild or underutilized foods, taxonomic names do not yet exist and, in other cases, different taxonomic sources may provide different scientific names for the same food. Examples are certain fruits, vegetables, fish, snails and insects. It was therefore decided that wild or underutilized foods are exceptions to the general rule and may be included in Indicator 2 even if their taxonomic identification is only at species level and/or through a local name. If possible, the country/region/culture of origin should be provided, or a photograph or voucher sample.

Other exceptions are those foods which are varieties (taxonomic name always including ‘var.’) but which are considered as equivalent to food species. These foods need to be described with an additional cultivar name in order to be taken into consideration for Indicators 1 and 2 (e.g., *Brassica oleracea* var. *capitata* ‘January King’). This additional criterion was necessary to avoid the reporting of commonly consumed foods and food consumption surveys without a specific biodiversity aspect for Indicator 2, and thus would artificially inflate the reporting on foods and surveys contributing to the indicators. Accordingly, the examples in **Table 1** demonstrate which of these ‘variety’ foods would contribute to Indicators 1 and 2.

As the reporting on Indicator 1 revealed many difficulties in deciding which foods should be included or excluded, detailed criteria were developed to guide users in reporting on Indicators 1 and 2. These general and specific criteria are listed in **Table 2**.

Table 1 Foods with cultivars contributing or not to Indicators 1 and 2

Food (species and varieties)	Cultivar	Contributing to Indicator 1 and 2 (yes or no)
Clementines (*Citrus reticulata* var. *clementine*)		No
Clementines (*Citrus reticulata* var. *clementine*)	'Oronules'	Yes
Nectarines (*Prunus persica* var. *nectarine*)		No
Nectarines (*Prunus persica* var. *nectarine*)	'Redgold'	Yes
Mange-tout peas or snowpeas (*Pisum sativum* var. *macrocarpum*)		No
Mange-tout peas or snowpeas (*Pisum sativum* var. *macrocarpum*)	'Oregon Sugar Pod'	Yes
Asparagus (*Asparagus officinalis* var. *altilis*)		No
Asparagus (*Asparagus officinalis* var. *altilis*)	'Del Monte 361'	Yes
Peppers, capsicum, chilli, green (*Capsicum annuum* var. *grossum*)		No
Peppers, capsicum, chilli, green (*Capsicum annuum* var. *grossum*)	'Kung Poa'	Yes
Peppers, capsicum, green/red (*Capsicum annuum* var. *grossum*)		No
Peppers, capsicum, green/red (*Capsicum annuum* var. *grossum*)	'King Arthur'	Yes
Broccoli (*Brassica oleracea* var. *botrytis*)		No
Broccoli (*Brassica oleracea* var. *botrytis*)	'Green Magic'	Yes
Cauliflower (*Brassica oleracea* var. *botrytis*)		No
Cauliflower (*Brassica oleracea* var. *botrytis*)	'Ravella'	Yes
Brussels sprouts (*Brassica oleracea* var. *gemmifera*)		No
Cabbage (*Brassica oleracea* var. *capitata*)		No
Cabbage (*Brassica oleracea* var. *capitata*)	'January King'	Yes
Curly kale (*Brassica oleracea* var. *acephala*)		No
Curly kale (*Brassica oleracea* var. *acephala*)	'Winterbor F1'	Yes
Spring greens (*Brassica oleracea* var. *acephala*)		No
Swede (*Brassica napus* var. *napobrassica*)		No
Swede (*Brassica napus* var. *napobrassica*)	'Wilhemsburger'	Yes
Turnip (*Brassica rapa* var. *rapifera*)		No
Turnip (*Brassica rapa* var. *rapifera*)	'Bavarian Turnip'	Yes

Table 2 Criteria for the inclusion or exclusion of foods for Indicator 1 and 2

Foods included	Foods not included
• Foods at cultivar/variety/breed level for common and imported foods (e.g., rice, banana, potato), preferably with scientific name. • For those foods contributing to the indicators: – different parts of plants (e.g., leaf, root, flower, stem, fruit) and animal (e.g., all muscle cuts contribute only once but all organs count separately); – different stages (e.g., egg, larva and young/adult animal); – only raw foods; except if just the cooked form of this food is available; – Colour and/or shape describing the variety, cultivar or breed (e.g., pear, brown-skinned (*Pyrus* sp.) or snake gourd (*Trichosanthes cucumerina*). • Foods with the number of cultivars/varieties/breeds per species even if not described by taxonomic or local name (e.g. *Musa* spp. – 4 varieties). • Common foods which are taxonomically speaking varieties <u>with</u> additional cultivar name. Examples are found in **table 1** (e.g., *Brassica oleracea* var. *capitata* 'January King'). • Ingredients of recipes, processed foods or botanical supplements/extracts (including beverages), if they meet criteria. • Genetically-modified foods	• Common or imported foods (e.g., rice, banana, potato) described only at species level, even if other specifications are given such as: – region; – country; – season; – colour as part of the food name (e.g., green beans) or as indication of processing (e.g., white or brown rice); – shape (e.g., medium-size carrot); – species name is followed by author (e.g., L. or Linn. [for Linnaeus], Mill.), which should not be confused with the cultivar/variety/breed name. • Foods with unspecific name, e.g., "wild green leaves", "reef fish", "bush meat". • Common foods which are taxonomically speaking varieties when described <u>without</u> an additional cultivar name. Examples are found in **table 1** (e.g., *Brassica oleracea* var. *capitata*). • Processed foods or recipes • Supplements, and plant or animal extracts (as powders, capsules, etc.) if not meeting the criteria • Fortified foods

Table 2 (cont.)

Foods included	Foods not included
• Wild and/or underutilized foods only described at genus/species level and/or with local name (e.g., "grasshopper"). The underutilized foods must be recorded on the 'list of underutilized species contributing to the nutritional indicators for biodiversity'[1]. • A local name in addition to an English/Spanish/French or taxonomic name if it is indicative for a variety/cultivar/breed (e.g., in brackets after the English/Spanish/French name).	• Common or imported foods described only with local name, or in addition to English, Spanish, or French name seeming to be the translation of the food (i.e., not indicative of variety/cultivar/breed.

[1] The reference list for underutilized food for biodiversity can be found on the INFOODS website http://www.fao.org/infoods/biodiversity/index_en.stm .

4.3 Surveys and Survey Instruments

Food consumption data from all surveys will be included, as long as they provide data on food consumption contributing to Indicator 2. These surveys will be mainly food consumption surveys but also could include market surveys, ethno-biological investigations and inventory studies. No minimum criteria are required concerning data quality, geographic area, time or population groups, and all surveys will count equally. The baseline count would not go back further than 1990 (date of the survey).

As of today, few national or regional food consumption surveys report foods at the cultivar/variety/breed level. In order to increase the reporting on food biodiversity, these surveys would need to be adapted to capture the additional dimension of food biodiversity. The review of existing surveys capturing food biodiversity was used to investigate the potential of dietary assessment instruments to obtain data on the consumption of foods contributing to Indicator 2. It was concluded that many dietary assessment instruments can be adapted to identify and/or report food biodiversity as varieties/cultivars/breeds or by local names (see *Annex 3*). It seems that people are most likely to identify by local name those foods at cultivar/variety/breed level that they frequently consume, grow or rear, or which are important in their local food system or are marketed by their variety name (e.g., Granny Smith apple).

It is recognized that investigators need to know how to adapt existing instruments to capture the consumption of foods contributing to Indicator 2. Therefore, FAO in collaboration with biodiversity experts in food consumption will develop guidelines on adapting existing food consumption instruments to capture food biodiversity.

To evaluate how well surveys take biodiversity into consideration in their design and/or reporting, a **secondary survey indicator** was developed to count the number of food consumption and similar surveys with at least one food reported for Indicator 2 and thus taking biodiversity into consideration in relation to the total number of surveys examined. The same survey, even if reported in different publications, should be counted only once.

4.4 Publication Level

All published and unpublished surveys can be used to search for food consumption data which report on food biodiversity. This includes peer-reviewed articles, published data in international/regional/national/sub-national survey reports, other published data (e.g., non-peer-reviewed journals), unpublished data, conference presentations (including posters), abstracts published from meetings and theses.

4.5 Reporting

The reporting on Indicator 2 and the secondary survey indicator will be carried out using a template (see *Annex 4*) that can be used at different levels: ecosystem, sub-national, national, regional or international.

The list of foods contributing to Indicator 2 should be included in each report, either in the template (if there are only few foods), an annex, or through a link to a website. Foods reported in different surveys for the same geographical area in the same year, will be counted only once. However, the different surveys would all contribute to the secondary survey indicator.

In some survey reports, not all cultivars/varieties/breeds consumed might be named but only a number per food listed (e.g., potato, four varieties). It is recommended that, in future, these cultivars/varieties/breeds names should also be listed and that the guidelines encourage this list to be presented in future reports.

As no national registry of food consumption surveys exists, information will have to be actively collected by FAO through literature searches and by contacting different organizations, e.g., national nutrition institutes, International Network of Food Data Systems (INFOODS) Regional Data Centre Coordinators, European networks (e.g., European Food Consumption Validation), Ministries of Agriculture and/or Health, principal investigators for large-scale ongoing surveys such as European Prospective Investigation into Cancer and Nutrition (EPIC) or the National Health and Nutrition Examination Survey (NHANES). FAO will collect this information and report on Indicator 2 every second year to the Global Environment Facility (GEF), CBD and UNEP and in international fora.

5 RECOMMENDATIONS

1. General recommendations:
    - increase funding for the adequate generation, compilation and dissemination of food consumption data that capture elements of biodiversity; resources should be sought at both national and international levels;
    - advocate the link between food consumption, food composition and biodiversity in the health, nutrition, agriculture, trade and environment sectors at both the national and international levels;
    - increase the availability and dissemination of data on consumption and composition of food biodiversity to enable more studies investigating the link between biodiversity, nutrition and health;
    - encourage taxonomic database compilers to include more entries on wild foods and foods at the level of subspecies, varieties, cultivars and breeds, so that this information can be used to identify foods for biodiversity;
    - develop a list of underutilized species for food biodiversity with foods of animal and plant origin which will serve as reference for counting underutilized species for Indicator 2; it should be available on the websites of the Global Facilitation Unit for Underutilized Species (GFU) and FAO/INFOODS.

2. Recommendations to FAO, in collaboration with Bioversity International where relevant:
    - elaborate, in collaboration with experts on food consumption and/or biodiversity, guidelines on how to modify existing food consumption survey instruments to incorporate food biodiversity (biodiversity-sensitive food consumption survey guidelines);
    - identify research needs (e.g., field testing) in order to improve the food consumption instruments, in collaboration with principal investigators conducting food consumption surveys;
    - facilitate collaboration among dietary survey investigators, food composition data compilers, botanist, zoologists and genetic resource specialists to ensure proper identification of plant and animal genetic resources for food;
    - encourage countries to incorporate elements of food biodiversity into national programmes and projects;
    - assist countries to develop multisectoral policies to encourage the sustainable use of biodiversity for food and agriculture;

- support the incorporation of food biodiversity elements into programmes, projects and policy advice in United Nations agencies, including FAO;
- investigate the expansion of the FAO/INFOODS network to include food consumption, or the creation of a new network on food consumption, e.g., through the International Union of Nutritional Sciences (IUNS), to facilitate reporting on Indicator 2;
- collect baseline data for Indicator 2 in 2009;
- report on Indicator 2 every two years to GEF and in international fora to raise awareness of the links between biodiversity, nutrition and health;
- disseminate the recommendations of the Expert Consultation widely as advocacy for biodiversity and to increase funding for data generation, compilation and dissemination of food biodiversity consumption and composition data;
- facilitate the collaboration among agricultural organizations, nutrition education institutions and policy-makers to increase the production and consumption of food biodiversity with demonstrated high nutritional and agronomic features to combat micronutrient deficiencies and other forms of malnutrition;
- convene another consultation to revisit the issue in three years' time in conjunction with the next International Conference on Diet and Activity Methods (ICDAM), which will be convened in Rome by FAO in 2012.

3. Recommendations to national and regional food consumption data generators and compilers:

   - generate more consumption data for food biodiversity, and when reporting, describe with their scientific names, i.e., genus, species, variety/cultivar/breed in addition to local names, and if possible with digital images;
   - report more wild and underutilized foods in food consumption and other relevant surveys;
   - send information on the survey and the list of foods contributing to Indicator 2 to FAO to be included in the Indicator 2 reporting;
   - increase collaboration with agricultural marketing and research institutions and departments in order to identify and promote food biodiversity, with positive nutritional profiles and good agricultural features;
   - use the FAO biodiversity-sensitive food consumption survey guidelines, once elaborated.

ANNEX 1

LIST OF PARTICIPANTS

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ANNEX 2

DRAFT AGENDA

Monday 8th June 2009

09.00-09.30	***Opening of the Expert Consultation:***
	Introduction, secretariat and experts Election of chairperson and rapporteurs. Adoption of agenda
	Background and objectives of the Expert Consultation
09.30-10.30	Background to indicator and discussion on the scope and general issues of the indicator
10.30-11.00	*Coffee break*
11.00-11.30	Review of methods, review of existing studies/surveys
11.30-12.30	Develop methodological guidelines, discussion of instrument adaptation
12.30-14.00	*Lunch*
14.00-16.00	Develop methodological guidelines, discussion of study design adaptation
16.00-16.30	*Coffee break*
16.30-18.00	Discussion on indicator (survey issues)

Tuesday 9th June 2009

09.00-10.30	Discussion on indicator (survey adaptation)
10.30-11.00	*Coffee break*
11.00-12.30	Continue discussion on indicator (food)
12.30-14.00	*Lunch*
14.00-16.00	Discussion on publication: reporting mechanisms and data gaps
16.00-16.30	*Coffee break*
16.30-18.00	Finalize recommendations
	Closing of the Expert Consultation

ANNEX 3

DIETARY ASSESSMENT INSTRUMENTS

Methods	**Potential for being adapted (high, medium, low)**	**Useful as preliminary work to be done before adaptation (high, medium, low)**
Food balance sheets	**Low**	**Low**
Market surveys	**High** These surveys provide information on food biodiversity, but do not provide the complete list of foods eaten, e.g., gathered or home-grown foods. Scientific names will be rarely given.	**Medium**
Biological inventory surveys	**Low** These surveys do not reflect food consumption.	**High** Useful as preliminary work to investigate available plants and animal species in an area.
Databases of universal product codes (UPCs) and electronic scanning	**Low** In general, UPCs are national codes on processed products, and most probably do not give information on species and subspecies level and below.	**Low** Could help to collect data in countries using UPCs.
Household budget surveys List-recall method Food-account method Inventory method Other techniques	**Low to medium** The instruments are country-specific and could be more promising in developed countries. Existing food lists would need to be extended in order to have details on cultivars, varieties or breeds. Additional questions could be added for biodiversity; but questionnaires are already long and cumbersome for respondents.	**Low**
Qualitative survey Household/ individual dietary diversity questionnaire	**Low to medium** Do not currently have the details on cultivars/varieties/breeds, but there is potential to add some questions on a small number of foods.	**Low**

Methods	Potential for being adapted (high, medium, low)	Useful as preliminary work to be done before adaptation (high, medium, low)
Duplicate portion method	**Low** The method provides only information on the whole diet and not on single foods.	**Low**
Dietary history	**Medium** As it is an open-ended instrument, people can spontaneously report cultivars/varieties/breeds and probing questions on food biodiversity can be added.	**High**
Food records Weighed food records Estimated food records	**Medium to high** As it is an open-ended instrument, people can spontaneously record cultivars/varieties/breeds. Probing questions on food biodiversity can be added.	**High**
Recall (e.g., 24-h or repeated)	**High** As it is an open-ended instrument, people can spontaneously record cultivars/varieties/breeds. Probing questions on food biodiversity can be added.	**High**
Food frequency questionnaire	**Medium to High** As it is a closed food list, it can be difficult to add new foods or cultivars/varieties/breeds. However, probing or open-ended questions on food biodiversity can be added.	**High**
Inventory of food biodiversity from key informants, interviews, community focus groups and observation, ethnobiology (people based)	**High** These inventories can provide an extended list of the available food biodiversity.	**High**
Coping strategy index	**Low** This method does not refer to any particular food.	**Low**
Food security questionnaire (qualitative surveys)	**Low** This method does not refer to any particular food.	**Low**

ANNEX 4

TEMPLATE FOR REPORTING FOODS CONTRIBUTING TO INDICATOR 2

The template can be used for any level of aggregation: ecosystem, sub-national, national, regional and global.

Type and scope of survey	Bibliographic reference	Time/ date of survey	Geographic/ ethnic coverage	Number of subjects and short description* if possible	Instrument used	Study and/or instrument adapted to capture biodiversity yes/no/ unknown	Total number of foods in survey	List of foods contributing to Indicator 2 (according to criteria)**	Indicator 2 (number of foods according to criteria)

* Age, sex, education or number of households, culture, socio-economic status (high, medium, low).
** If many foods are reported, the food list should be given in an annex.

An example of usage of the template is given in *annex 6* (baseline reporting of 2009).

Secondary survey indicator: number of surveys with biodiversity aspects per number of surveys examined.

ANNEX 5

EXAMPLES OF NATIONAL OR REGIONAL SURVEYS THAT WERE ADAPTED FOR BIODIVERSITY

A. Rural Bangladesh: a 24-hour-recall household dietary survey (Kennedy *et al*., 2005)

Two indicators of plant genetic diversity were field tested in rural Bangladesh using the 24-h-recall method. The two indicators were cultivar diversity[2] and germplasm type by degree of modification (modern, locally improved, traditional, and unknown). The female head of household or household member who prepared the family meals was interviewed and asked to show the amount of each food used in each meal.

The **adaptation** of the study design and its instrument:

- An inventory list of existing cultivar diversity within the edible plant species was established beforehand through informal interviews with farmers, market surveys of crops and direct observation of both wild and cultivated plant species.
- This inventory permitted the listing and pre-coding of specific cultivars for some of the 400 foods in the food list (e.g., 38 rice cultivars) and respondents were asked to identify the consumed cultivar.

The study demonstrated that respondents can identify food cultivars and varieties. Main crops were known by their local cultivar names (Bengali names). For example, more than 80 percent of households were able to identify the 21 rice cultivars that they consumed during the last 24 hours out of the 38 listed. In addition, they were able to give the Bengali cultivar names for several other foods: one name for lentils, chickpea and jujube; two for black gram, grass pea and mung bean; four for banana; five for eggplant (aubergine) and six for potatoes. Of the 50 known leafy vegetable species, no cultivar could be mentioned and only 15 were consumed. It is assumed that respondents in rural areas, owing to their agricultural knowledge, can more easily identify cultivars than those living in urban settings.

The study demonstrated the following limitations when capturing biodiversity of consumed foods:

- Correct species and cultivar identification and coding are essential in order to assist respondents in distinguishing different cultivars. Therefore, a botanist or similar specialist needs to be involved during the initial qualitative research phase.

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[2] Defined in terms of the number of cultivars or varieties available within a given species.

- If several species are included under the same food code in the questionnaire, it may be difficult to attribute the corresponding cultivar.
- In general, the cultivar name is not known by respondents for gathered foods or for foods consumed infrequently.

This study contributed 60 foods for Indicator 2.

B. A case study of Kitui District, eastern Kenya (Musinguzi *et al*., unpublished)

The objective of the study was to test and document the use of variety/cultivar/breed details in dietary assessment in a Kenyan district using a qualitative food frequency questionnaire (FFQ) that was administered to households (each with an index child) to capture the food consumption in three periods preceding the survey: 24 hours, 7 days and 1 month.

The **adaptation** of the study design and its instrument:

- The area was stratified into six agro-ecological zones.
- A comprehensive food list was developed through focus group discussions with key informants, market and home visits, food catalogues and a final harmonization meeting between the six groups to eliminate double listing of cultivars and varieties.
- In order to familiarize investigators with the questionnaire before data collection, they were trained to probe correctly and list all the foods including their varieties (purchased, own produced, gathered from the wild, etc.).
- The pilot testing of the questionnaire (see extract in **Table 3**) allowed an adjustment to ensure that varieties were correctly identified and written by the interviewer and that respondents use the food list and the pictures adequately.

The study demonstrated that local communities can usually correctly identify consumed foods and their cultivars.

Food consumption data can be collected below subspecies level if the cultivars and varieties are pre-listed. The detailed list of cultivars and varieties is additional work and needs to be compiled through a thorough pre-survey involving the study communities.

This study contributed 331 foods for Indicator 2.

Table 3 An extract of the food frequency questionnaire used

	Frequency of consumption				Contributes to Indicator 2
Food groups, items and varieties consumed	**Household/index child**				
	Last 24 hours	**Last 7 days**	**Last 1 month**	**Food source***	**Yes/no**
Mbemba (maize)					No (species name)
Katumani	yes			1	Yes
Kikamba					No (not consumed)
Nduma 41		yes		3	Yes
Nduma 42			yes	4	Yes
Pioneer/pionea			yes	2	Yes
Makueni			yes	2	Yes
Makueni DH01			yes	6	Yes
511			yes	2	Yes
Mwee (pearl millet)					No (species name)
Agriculture/ngilikasa/ ndilikasa/katungulu/ katumani		yes		2	Yes
Kikamba/local		yes		1	Yes
Wa meru			yes	5	Yes
Musele (rice)					No (species name)
White	yes			2	No (colour indicates level of processing)
Brown			yes	2	No (colour indicates level of processing)
Fats and oil group					
Mauta ma meo	yes			6	No (no information on the food)

* The food source or food varieties (where applicable) mentioned: 1 = own production, 2 = purchased/bought, 3 = borrowed, 4 = gift, 5 = collected from wild, 6 = food aid, 7 = other (specify).

C. The Lao People's Democratic Republic survey of aquatic rice-based ecosystems: a 24-hour recall monthly household survey (FAO/LARReC, 2007; Garaway, 2008)

The Ministry of Agriculture of the Lao People's Democratic Republic, the Living Aquatic Resources Research Center (LARReC) and the FAO–Netherlands Partnership Programme created a suitable methodology to collect data on fish and other aquatic animals' (OAAs) catch and consumption at the household level (FAO, 2007). The principal objectives were to assess the catch of aquatic biodiversity (wild species) from rice-based ecosystems in different topographical and agro-ecological zones within the Lao People's Democratic Republic in the dry and wet seasons. The survey covered a one-year period and yielded information on acquisition, amounts and uses of fish and OAAs using a 24-h-recall per household.

The **adaptation** of the study design and its instrument:

- A questionnaire was developed, field tested and improved. Twelve rounds of data were collected, at approximately monthly intervals. After the first six rounds of data collection in the dry season, the questionnaire and method of implementation were significantly improved through additional training and better food classification. Hence, during the wet season, better and more detailed data were collected, including the classification of fish and OAAs. For example, "unidentified small fish" was significant in the dry season and not in the wet season – possibly as a result of better classification in the wet season.
- On the questionnaire form, each species that was caught was recorded as a separate record, where this was possible. These data were useful when considering biodiversity.
- Field staff were trained in workshops to obtain a sound understanding of the purpose and process of data collection and to conduct interviews on biodiversity.
- A comprehensive database was developed for the analysis of data, and staff were trained in data input and management.
- No photographs were used or any other specific identification material.

The study demonstrated that respondents could identify the wild species of different fish and OAAs caught from their aquatic rice-based ecosystems:

- Respondents were able to identify the fish species more easily than the OAAs.
- Forty-six fish species were consumed and named while for two categories the name was not known (grouped under “unidentified small fish” and “fish – species unidentified”).
- Six amphibian species were consumed, of which the name was known for three.
- Only five mollusc species were known by name. A large majority of the species consumed remained unidentified.
- The overall reptile consumption was low. Several species were consumed but only three species were known by name.
- Of the aquatic insects, grasshoppers, dragonflies and ant eggs were consumed but were not identified at the species level.

The study demonstrated the following limitations in the attempt to capture the biodiversity of the foods consumed:

- As the study design concentrated on the biodiversity of gathered foods, the consumption of other foods was not recorded.
- The data probably underestimated the number of species for the following reasons:
  - Without intensive work before the survey to identify all wild species (e.g., through identification aids such as photo books, or predefined food lists), numerous problems of identification, inaccuracies and misclassifications will remain.
  - Some species will remain unidentified because they are mixtures of species, e.g., small fish that are, in fact, many species in a single catch. This problem seems difficult to resolve.
  - Even though respondents were able to identify the foods by Lao names, the corresponding scientific name could not be identified by the survey staff.

Note: Because of a lack of compositional data for the species identified in this survey, another study was conducted to investigate the nutritional composition of the most frequently-consumed wild foods (Nurhasan, 2008). The results of these studies enabled the assessment of the nutritional contribution of fish and OAAs to the diet of the Lao study population.

This study contributed 64 foods for Indicator 2.

D. Other studies on rice-based ecosystems (Halwart and Bartley, 2005; Halwart, 2008)

The studies on the availability and use of aquatic biodiversity from rice-based ecosystems in Cambodia, China, Lao People's Democratic Republic and Viet Nam documented the existence of 145 fish species, 11 crustacean species, 15 mollusc species, 13 reptile species, 11 amphibian species, 11 insect species and 37 plant species that were directly caught or collected from the rice fields and used by rural people during one season.

Table 4 Number of aquatic species collected from rice-based ecosystems and used by rural households in Cambodia, China, Lao People's Democratic Republic and Viet Nam

Foods	Cambodia	China	Lao People's Democratic Republic	Viet Nam	Total
Amphibians	2	3	10	3	11
Crustaceans	6	4	5	3	11
Fishes	70	54	26	14	145
Molluscs	1	5	8	7	15
Reptiles	8	1	7	3	13
Plants	13	20	20	15	37
Insects	2	-	16	6	11
Total	**102**	**87**	**92**	**51**	**232**

Source: Halwart, 2008.

The **adaptation** of the study design and its instrument:

- Village-level participatory assessments were conducted in the villages to collect information on the availability, use, preference and seasonality of aquatic animals and plants in rice field ecosystems. The key informants were local authorities, farmers, fishers, fishmongers, women, children and older people.
- Specimens were collected by the researchers in the field, by informants, and at the local markets.
- Photographs and samples were collected for further identification.

The study demonstrated that the native population living in the rice-based ecosystem can name in the local language a huge number of plant and animal species, sometimes even varieties.

This is a special case because the raw survey data were available on a CD–ROM in addition to the published article, which permitted the counting of the foods for Indicator 2 using the unpublishedfood lists of the different countries. The count for the Indicator 2 is derived from the raw food consumption data.

This study (Halwart and Bartley, 2005) contributed the following foods for Indicator 2:

Country/region	Number of foods contributing to Indicator 2
Cambodia	107
China	73
Lao People's Democratic Republic	82
Viet Nam	54
Asia	316

E. A crop production and marketing survey in the Kolli Hills (India), a non-food consumption survey (Nagarajan *et al*., unpublished)

The survey assessed the change in production and marketing of underutilized minor species (*Eleucine corocona*, *Setaria italica*, *Panicum milliaceum*) after an intervention with the objective to improve the utilization and conservation of these three underutilized millet species. The survey did not investigate dietary habits, but instead assessed food security using the household food insecurity access instrument. Farmers who allocated more land under minor millets, and participated in a market-based intervention for the same, sold all their produce, and purchased rice from the external markets with the cash earned..

It is assumed that the population consumed these minor millet species because they are sold in local markets. Therefore, they can contributed to Indicator 2.

There was no **adaptation** of the study design or instrument for biodiversity.

The study demonstrated that farmers are able to name the species of minor millet they plant.

This study contributed 3 foods for Indicator 2.

F. A seed market survey on pigeon pea in Kenya (FAO, unpublished)

This survey was conducted to promote the sustainable use of crop genetic resources and counted 24 cultivars of pigeon peas (FAO, unpublished).

The **adaptation** of the study design and its instrument:

- The dietary diversity questionnaire being proposed by FAO (FAO, 2008b) was used without adaptation. A question was added about dishes made from pigeon peas, including which variety is used in the recipe, and the frequency and season of consumption of the dish.

The study demonstrated that local communities could correctly identify the variety of an ingredient in dishes (in this case, pigeon pea varieties in different recipes) and were able to add a further 12 consumed varieties to a predefined list of 12 varieties.

This study contributed 24 foods for Indicator 2.

G. International case studies of traditional food system assessment methods

G.1. Guidelines for procedures (Kuhnlein *et al*., 2006)

The Centre for Indigenous Peoples' Nutrition and Environment (CINE) developed methods to understand and document traditional food systems by working with several communities of Dene/Metis, Yukon First Nations, Inuits (in Arctic Canada), and of several Asian indigenous peoples. This procedure helped to understand parameters of the food diversity within a broad geographical region, and to consider and plan food-based interventions to improve health of indigenous peoples within the same culture and environmental setting.

The **adaptation** of the study design and its instrument:

- Traditional food lists were gathered, including famine foods, little-used or unused foods through key informant interviews or focus groups with elders. For all foods, the consumed parts were described (see **Table 5**), as well as the origin (for animals if wild, domestic or hunted; and for plants if they were wild, gathered or cultivated), seasonality, preparations, suitability for children, dietary food use and nutrient intake patterns and cultural context.
- The taxonomic names of traditional foods were identified by herbarium scientists and taxonomic zoologists, and their nutrient composition was either analysed or compiled.

Table 5 Percentage of the population of three Inuit communities consuming each food

Species	Part	Inuvialuit (n = 409)	Kitikmeot (n = 322)	Kivalliq (n = 355)	Contributes to Indicator 2 Yes/no
Trout	Liver	9	21	2	Yes
	Fishpipe/ stomach	9	17	1	Yes
	Bones	4	5	3	Yes
	Skin	22	30	13	Yes
	Head	22	42	24	Yes
	Fat	12	26	11	No (as fat was part of the meat)
	Soup/ broth	17	43	17	No (recipe)
	Meat	40	56	39	Yes
	Eggs/roe	11	26	9	Yes

The results of all the food systems assessment using the CINE methodology can be found in Kuhnlein, Erasmus & Spigelski (2009).

G.2. Community food system data tables, the Pohnpei case study: community of Mand, Federated States of Micronesia (Englberger *et al.*, 2009a)

The objective of the study was to document the Pohnpei traditional food system using the CINE method by determining the foods and varieties available and/or consumed in Pohnpei. Information on 381 different foods was collected, using key informant interviews, focus group discussions and observation. A further objective was to assess the diet prior to and after a two-year local food promotion intervention using dietary assessment methods (Englberger *et al*., 2005; Kaufer, 2008).

The **adaptation** of the study design and its instrument:

- Test the CINE methodology using a participatory, multiple-methodology, ethnographic approach.
- The dietary assessment questionnaires were adapted to distinguish between imported and locally-grown foods. Two dietary assessment methods, a repeated quantitative 24-h-recall for two non-consecutive days and a 7-day FFQ were used. They included foods at species and variety levels, also described by local names.

The study demonstrated that local communities can correctly identify foods they consume, including varieties, and are able to add to a predefined list of varieties other consumed varieties.

Table 6 is an extract of the results documenting the Pohnpei traditional food system. The complete list of foods was provided but is not shown.

This study contributed 920 foods for Indicator 2.

Table 6 Extract of the results of the Pohnpei traditional food system

Scientific name	English/ common name	Pohnpei name	Part(s) used	Seasonality	Marketed	Source*	Contributes to Indicator 2 Yes/no
Starchy staples							
Alocasia macrorrhiza (2 var.)	*Alocasia* taro	Ohd	Corm	No	No	W	Yes (1 food part x 2 var. = 2)
Artocarpus altilis (13 var.)	Breadfruit	Mahi	Fruit	Yes	Yes	C	Yes (1 food part x 13 var. = 13)
Artocarpus mariannensis (2 var.)	Seeded breadfruit	Meipa/Meikole and Meisi	Fruit, nut	Yes	No	C	Yes (2 food parts x 2 var. = 4)
Artocarpus heterophyllus	Jackfruit	Jackfruit	Fruit	Yes	No	C	No (cultivated)
Cyrtosperma chamissonis (now *Cyrtosperma merkusii*) (12 var.)	Giant swamp taro	Mwahng	Corm	No	Yes	C	Yes (1 food part x 12 var. = 12)
Xanthosoma sagittifolium (2 var.)	*Xanthosoma* taro	Sawahn awai	Corm	No	Yes	C	Yes (1 food parts x 2 var. =2)
Colocasia esculenta (5 var.)	*Colocasia* taro	Sawa	Corm, leaves	No	Yes	C	Yes (2 food parts x 5 var. = 10)
Musa spp. (26 var.)	Banana	Uht	Fruit, bud	No	Yes	C, W	Yes (2 food parts x 26 var. = 52)
Dioscorea spp. (42 var.)	Yam	Kehp	Tuber	Yes	Yes	C	Yes (1 food part x 42 var. = 42)
Manihot esculenta (9 var.)	Tapioca	Kehp tuhke	Tuber	No	Yes	C	Yes (1 food part x 9 var. = 9)
Ipomea batatas (6 var.)	Sweet potato	Pedehde	Root, leaves	No	Yes	C	Yes (2 food parts x 6 var. = 12)
Coconut and other palms							
Clinostigma ponapensis	Mountain palm	Kotop	Heart	No	No	W	Yes (wild)

Scientific name	English/ common name	Pohnpei name	Part(s) used	Seasonality	Marketed	Source*	Contributes to Indicator 2 Yes/no
Cocos nucifera (5 var.)	Coconut	Nih	Nut, juice, embryo, inflorescence, heart	No	Yes	C, W	Yes (5 food parts x 5 var. = 25)
Cocos nucifera (1 var.)	Coconut	Nih adohl	Husk, nut, juice, embryo, inflorescence, heart	Yes	No	C	Yes (6 food parts x 1 var. = 6)
Elaeis guineensis	Oil-palm	Apwuraiasi, nihn aprika	Meat, embryo	Yes	No	W	Yes (wild, 2 food parts = 2)
Fruits, nuts and other							
Ananas comosus	Pineapple	Pweinaper	Fruit	Yes	Yes	C	No (cultivated)
Citrus aurantifolia (3 var.)	Citrus	Karer, peren	Fruit, leaves	Yes	Yes	C, W	Yes (2 food parts x 3 var. = 6)
Pandanus tectorius (13 var.)	Pandanus fruit	Kipar, deipw	Fruit, seed	Yes	Yes	C, W	Yes (2 food parts x 13 var. = 26)
Adenanthera pavoniva	Red bead	Kaikes	Nut	Yes	No	W	Yes
Saccharum officinarum (8 var.)	Sugar cane	Seu	Stem	No	Yes	C	Yes (1 food part x 8 var. = 8)
Vegetables							
Capsicum annuum	Chilli pepper	Sele	Leaves, fruit	No	Yes	C, W	Yes (2 food parts = 2)
Other plants: drinks/spices							
Cinnamomus carolinense	Native cinnamon	Madeu	Bark	No	Yes	C, W	Yes (1 food part)
Fish **							
Acanthurus gahhm	Surgeonfish	Tamwarok	Meat, eggs, heart,liver, eyeball	No	Yes	W	Yes (5 food parts x 1 var. = 5)
Aphareus rutilans	Silvermouth, lehi	Lol Imwin pwadaik toantoal	Meat, eggs, heart,liver, eyeball	No	Yes	W	Yes (5 food parts x 1 var. = 5)
Cephalopholis argus (2 var.)	Bass-grouper, peacock grouper	Mwoalusulus, mwoalus	Meat, eggs, heart,liver, eyeball	No	Yes	W	Yes (5 food parts x 2 var. = 10)
Elagatis bipinnulatus	Rainbow runner	Mwunseik	Meat, eggs, heart,liver, eyeball	No	Yes	W	Yes (5 food parts x 1 var. = 5)

Scientific name	English/ common name	Pohnpei name	Part(s) used	Seasonality	Marketed	Source*	Contributes to Indicator 2 Yes/no
Gymnosarda unicolor (2 var.)	Dogtuna, dogtooth tuna	Manguro, sileu	Meat, eggs, heart,liver, eyeball	No	Yes	W	Yes (5 food parts x 2 var. = 10)
Thunnus albacares	Yellowfin tuna	Karangahp	Meat, eggs, heart,liver, eyeball, intestine	No	Yes	W	Yes (6 food parts x 1 var. = 6)
Other seafood							
Birgus latro	Coconut crab	Emp	Meat, eggs, "wisohl en emp"	No	Yes	W	Yes (3 food parts x 1 var. = 3)
Chelonia mydas	Green turtle	Kalahp (wehi)	Meat, eggs, heart, liver, intestine	No	Yes	W	Yes (5 food parts x 1 var. = 5)
Palinurus spp.	Lobster	Uhrena	Meat, eggs	No	Yes	W	Yes (2 food parts x 1 var. = 2)
Birds							
Ducula oceanica	Pigeon	Mwuroi	Meat, egg, heart, liver	No	Yes	W	Yes (4 food parts x 1 var. = 4)
Gallus domesticus	Chicken	Malek	Meat, egg, heart, liver	No	Yes	W	Yes (4 food parts x 1 var. = 4)
Gallus domesticus	Wild chicken	Malek en wel	Meat, egg, heart, liver	No	Yes	D, W	Yes (4 food parts x 1 var. = 4)
Phaethon lepturus	White-tailed tropic bird	Sihk	Meat, heart, liver	No	No	W	Yes (3 food parts x 1 var. = 3)

* C = cultivated; W = wild; D = domesticated.

** 121 other wild fish were consumed in the Pohnpei traditional food system. The complete list of fish was provided, and for all of them 5 food parts were consumed. These 120 wild fish contribute 121 x 5 = 605 for the Indicator 2.

ANNEX 6

BASELINE REPORTING OF INDICATOR 2 OF 2009

Type and scope of survey	Bibliographic reference	Time/ date of survey	Geographic/ ethnic coverage	Number of subjects and short description* if possible	Instrument used	Study and/or instrument adapted to capture biodiversity yes/no/ unknown	Total number of foods in survey	List of foods contributing to Indicator 2 (according to criteria)**	Indicator 2 (number of foods according to criteria)
Assessment of plant genetic diversity in a rice-based diet	Kennedy *et al*., 2005	February-March 2000	Rural Bangladesh	313 households	24-h-recall households dietary survey	Yes	26		60
Food consumption surveys including sub-species level	Musinguzi *et al.,* unpublished		Kenya, Kitui district, Eastern Kenya	1003 households from 20 villages	Inventory, quantitative FFQ covering 1, 7 or 30 days	Yes	224		331
Lao survey, assessment of the catch of aquatic biodiversity (wild species) from rice-based ecosystems	FAO/LARReC, 2007; Garaway, 2008	October 2006 – October 2007, including "dry" season and "wet" season	Lao People's Democratic Republic, 3 provinces (12 districts)	240 households	24-h-recall monthly households dietary survey, catches	Yes	70		64
Assessment of indigenous knowledge on use of aquatic biodiversity from rice-based ecosystems	Halwart & Bartley, 2005; Halwart, 2008	Cambodia: September–December 2001 China: August–November 2001 Lao People's Democratic Republic: dry season 2002 and monsoon season 2003 Viet Nam: August–September 2002	Cambodia: Kampong Thom Province China: Xishuangbanna, Yunnan Province Lao People's Democratic Republic: Xhieng Khouang and Houa Phanh Provinces Viet Nam: Lai Chau and Hoa Binh Provinces	Cambodia: 3 villages China: 12 ethnic groups, including Dai, Akha, Lahu, Yan, Kemu, Kucon minorities Lao People's Democratic Republic: 6 villages Viet Nam: 2 study sites Tuan Giao and Mai Chau	Samples collection and interviews on availability, traditional use and collecting methods	Yes	Cambodia: 102 China: 63 Lao People's Democratic Republic: 89 Viet Nam: 89		Cambodia: 107 China: 73 Lao People's Democratic Republic: 82 Viet Nam: 54

(cont.)

Type and scope of survey	Bibliographic reference	Time/ date of survey	Geographic/ ethnic coverage	Number of subjects and short description* if possible	Instrument used	Study and/or instrument adapted to capture biodiversity yes/no/ unknown	Total number of foods in survey	List of foods contributing to Indicator 2 (according to criteria)**	Indicator 2 (number of foods according to criteria)
Assessment of the change in production and marketing minor millet, survey of food security	Nagarajan *et al*., unpublished	2006	India, Dharmapuri district in Tamil Nadu	6 villages with minor millets cultivation, 129 households surveyed	Household food insecurity access	No	3	*Eleucine corocona*, *Setaria italica*, *Panicum milliaceum*	3
Household and pigeon pea seed market survey, conducted to promote the sustainable utilization of crop genetic resources	FAO, unpublished	2006–07	Kenya, Makueni district,	For focus groups: at least one farmer from each village (from 4 sites, each site had 5-18 villages); 400 households	Focus group discussions, use the dietary diversity questionnaire being proposed by FAO	Yes	1	Pigeon pea: Kionza, Kikomo, Munovi, Mwiyumbi, #777, #557, Katoli/00040, Syombonge, Katheke, Mukuni, Muthoila, Nguyu, Kanyai-Kathungu, Kanyai-Ngangani, Mkolokolo, Mwikuyu, Mkune, Katumani, Musungu, Improved long, Improved medium, Improved short, Local unknown	24
Study of traditional food system/ indigenous peoples' food systems	Kuhnlein, Erasmus & Spigelski, 2009	1991-2008	9 countries: Canada, Colombia, India, Japan, Kenya, Micronesia (Federated States of), Nigeria, Peru, Thailand	See following specific studies	List of local foods, Dietary surveys: 24-h-recalls/ repeated/ weighed food intake, FFQ (daily, weekly, monthly	Yes	See specific studies further down	See following specific studies	See following specific studies

(cont.)

Type and scope of survey	Bibliographic reference	Time/ date of survey	Geographic/ ethnic coverage	Number of subjects and short description* if possible	Instrument used	Study and/ or instrument adapted to capture biodiversity yes/no/ unknown	Total number of foods in survey	List of foods contributing to Indicator 2 (according to criteria)**	Indicator 2 (number of foods according to criteria)
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 7)	2004	Japan, Saru River region, Ainu community	Elderly and youth	Focus groups;,food gathering	Yes	18	*Allium victorialis* (2 var.), *Amphicarpa bracteata, Amphicarpa Edgeworthii* var. *japonica, Anemone flaccida* (2 var.), *Angelica edulis, Aralia cordata, Lilium cordatum* (2 var.*), Lilium cordatum* var. *glehnii, Matteuccia struthiopteris, Petasites Japonicus, Phellodendron amurense, Cervus Nippon, Oncorhynchus, Margaritifera margaritifera*	17
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 4)	February-May 2004	Peru, Cenepa, Awajun	49 mothers who had children under 6 years of age	Inventory of food biodiversity, repeated 24-h- recalls	Yes	205	see publication	192
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter s 1-3)	a. 1997-98, 2003	Canada a. Baffin Inuit:	a. representatives of 18 communities. Adults and youth	a. Inventory of food biodiversity	Yes	a. 82	see publication	a. 87
		b. 1993-95, 2000–01	b. Gwich'in:	b. 3 Dene/ Métis communities	b. Inventory of food biodiversity, 24-h -recalls, traditional FFQ		b. 51	see publication	b. 51
		c. 1981-85, 2006	c. Nuxalk:	c. Elderly and women	c. 24-h-recalls, inventory of food biodiversity, ecological survey		c. 67	see publication	c. 67

(cont.)

Type and scope of survey	Bibliographic reference	Time/ date of survey	Geographic/ ethnic coverage	Number of subjects and short description* if possible	Instrument used	Study and/or instrument adapted to capture biodiversity yes/no/ unknown	Total number of foods in survey	List of foods contributing to Indicator 2 (according to criteria)**	Indicator 2 (number of foods according to criteria)
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 9)	a. 2001-02 b. NA	India a. Bhil b. Dalit	a. 187 households in 3 seasons b. 149 mothers and their children from 19 villages	a. Key informant interview b. individual and group interviews	Yes	a. 91 b. 263	see publication	a. 70 b. 171
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 12)	June 2004 - June 2005	Nigeria, 4 southern states, Igbo	800 house-holds from 8 villages	Interviews, 24-h-recalls, weighted food records	Yes	216	see publication	158
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 5)	2004-05	Colombia, State of Caqueta, Ingano	Adults	Interviews, 24-h-recalls	Yes	152	see publication	139
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 8)	2004-05	Thailand, Sanephong, Karen	Adults, children	Focus group interviews, semi-structured question-naires, observa-tions	Yes	315	see publication	248
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 11)	August 2004 - January 2005	Kenya, Ngong Division, Maasai	120 house-holds	24-h-recall, 3day FFQ	Yes	64	see publication	33
	Kuhnlein, Erasmus & Spigelski, 2009 (chapter 6)	May - August 2005	Micronesia (Federated States of), Pohnpei	47 households (15-65 years)	quantitative 24-h-recalls, 7-day FFQ, interviews	Yes	239	see publication	920

(cont.)

Type and scope of survey	Bibliographic reference	Time/ date of survey	Geographic/ ethnic coverage	Number of subjects and short description* if possible	Instrument used	Study and/or instrument adapted to capture biodiversity yes/no/ unknown	Total number of foods in survey	List of foods contributing to Indicator 2 (according to criteria)**	Indicator 2 (number of foods according to criteria)
Participatory reseach on commonly consumed indigenous vegetables	Kimiywe, Akundambweni & Namutebi (unpublished)	March 2006-June 2008	Kenya, Vihiga district, Lake Victoria Basin	30 small holder women farmers	Key informant interviews to capture biodiversity, post harvest practices, samples collection	Yes	19	Food list***	17
Participatory reseach on commonly consumed indigenous vegetables	Akundambweni et al., 2009	June 2006-November 2008	Uganda, Iganga district, Ikumbya and Makuutu	15 small holder women farmers	Key informant interviews to capture biodiversity, post- harvest practices, samples collection	Yes	27	NA	23
Consumption survey with emphasis on potatoes	Domínguez and Creed-Kanashiro, 2006	May/June 2004. February 2005	Peru, 6 rural communities in Huancavalica	75 mothers and 75 children 6-36 months	weighing	yes	NA	Food list ****	128

NA = not available

Notes:

***** Age, sex, education or number of households, culture, socio-economic status (high, medium, low).

****** If many foods are reported, the food list should be given in an annex or complementary file.

**** Crotalaria ochroleuca*, *Crotalaria brevidus*, *Cucurbita maxima, Solanum americanum, Solanum scabrum*, *Solanum villosum*, *Solanum eldoretii*, *Amaranthus dubius, Amaranthus hybridus, Amaranthus cruentus*, *Amaranthus hypochondriacus, Amaranthus lividus*, *Amaranthus graecizans*, *Cleome gynandra, Corchorus olitorus, Corcorus trilocularis, Phaseolus vulgaris*, *Brassica carinata*

******** 7 Chuño varieties (manua, siri, yungay, cocharcas, de papa amarilla, yanamanua, yuraq peruanita) and 121 potato varieties (Acero suyto, Achunguilla, Ajo suyto, Ajupa qallum, Alccay hualas, Alccay palta/chupi palta, Alccay pasna, Alianza, Allqa huayro, Amarillis, Ame ame, Ancapa sillum, Asnapa runtun, Ayrampo/yana palta, Azul macho, Blanca nativa, Botegulo/botijuela, Camotillo, Canchán, Capiro, Capirusa, Caramelo, Ccello huayri, Ccello marquina, Ccello suyto, Chajere, Checche pasna, Chunya, Clavelina, Cordovina, Cuchipa ACAN, Cuchipa acan, Docis negra, Doris, Emilia, Gaspar, Gravelina, Huancavelica, Hungulo, Imasa huaccachi, Jala suyto, Jori marquina/marquina/moronquis, Juritipa, Lagartija, Liberteña, Limeña/peruanita, Llunchay huaccachi, Maco, Manua, Mariva, Mi Perú, Morunquis negro, Muro caramelo, Muro lagarticca, Muro tarmeña, Muru huayro, Muru morunquis, Muru suyto, Ñata/pasñaca, Occe papa, Papa amarilla, Papa blanca, Papa blanca sancochada,

Papa blanca sin cascara, Papa huayro sin cascara, Papa larga, Papa nativa promezio, Papa yungay, Pashña, Pasña rojiza, Pasñahuaccachi, Payapa ancón, Perricholi, Piña, Poccya suyto, Poccya/puccya, Polos ayrampo, Promesa, Puca ajo suyto, Puca huayro, Puca lagarto, Puca nahui, Puca palta, Puca Perú, Puca piña, Puca puccya, Puca retipa sisan, Puca soncco, Puca suyto camotillo, Quisca mantenga, Renacimiento, Retipa sisán, Revolución, Revolución, Roja, Roja suyto, Rojo camotillo, Rosa, Runtus, Sary, Sirina, Suyto amarilla, Suyto blanco/yuracc suyto, Suyto camotillo, Suyto poccea, Tarmeña, Trajin, Trajin huaccachi, Tumbay, Tumbay amarilla, Tumbay blanca, Utupa runtun, Vacapa rurun, Yana jaspar, Yana puqya, Yana suyto, Yanadoce, Yanamanua, Yanawingo, Yuracc nahui, Yurak tomasa)

Secondary survey indicator: 20 surveys with biodiversity aspects of 20 surveys examined.

If the reader has any study to report with food consumption data contributing to Indicator 2 we would appreciate receiving them (nutrition@fao.org with the subject line ‘For the Nutritional Indicators for Biodiversity’).

ANNEX 7

GLOSSARY[3]

Biodiversity: the variability among living organisms from all sources, including terrestrial, marine and other ecosystems and the ecological complexes of which they are part; it covers diversity within species, between species and of ecosystems; synonyms: biological diversity, ecological diversity.

Breed: (1) a subspecific group of animal species, within a single zoological taxon of the lowest known rank, with definable and identifiable external characteristics that enable it to be separated by visual appraisal from other similarly defined groups within the same species; (2) a group of domestic livestock for which geographical and/or cultural separation from similar groups has led to acceptance of its separate identity.

Cultivar (from cultivated + variety) (abbr.: cv.): a category of plants that is below the level of a subspecies taxonomically and equivalent taxonomically to variety, and is found only in cultivation; it is an international term denoting certain cultivated plants that are clearly distinguishable from others by stated characteristics and that retain their distinguishing characteristics when reproduced under specific conditions; the naming of a cultivar should conform to the International Code of Nomenclature for Cultivated Plants (the ICNCP, commonly known as the "Cultivated Plant Code"); a cultivar is named with a cultivar (or fancy) epithet, a word or words in a vernacular language (unless published prior to 1959), or a botanical (Latin) epithet already established for a taxon now deemed to be a cultivar, formed according to the precepts of the code; the epithet is printed in roman characters, not italic, takes a capital first letter and is enclosed in single quotation marks, for example, *Hosta kikutii* 'Green Fountain'; cultivar names, unlike varieties, have generally been registered with an appropriate body in order to associate that name with a particular population and, usually, to claim rights over the population.

Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (CBD, 1993).

Food biodiversity: the diversity of plants, animals and other organisms used for food, covering the genetic resources within species, between species and provided by ecosystems.

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[3] Most definitions are adapted from FAO (1999) and FAO (2001), and are the same as those used for Indicator 1 (FAO, 2008a).

Genetic resources: means genetic material of actual or potential value (CBD, 2010).

Genetic material: means any material of plant, animal, microbial or other origin containing functional units of heredity (CBD, 2010).

Genus (pl.: genera): a group of closely related species, whose perceived relationship is typically based on physical resemblance, now often supplemented with DNA sequence data.

Species: below the level of genus, species is a class of potentially interbreeding individuals that are reproductively isolated from other such groups having many characteristics in common; species classifications are subject to review and change as new genomic and other scientific evidence is considered; by convention, a species is assigned a two-part italicized name in Latin, the genus being listed first (with its leading letter capitalized) and the species second; the name of the species is the whole binomial, not just the second term, for example, apple belongs to the species *Malus domestica*. Species is sometimes abbreviated: "spec." or "sp." *singular*.

Subspecies: population(s) of organisms sharing certain characteristics that are not present in other populations of the same species; the taxonomic naming convention is to append "ssp." or "subspec." and the Latin name in italic to the species name, for example *Prunus domestica* L. ssp. *domestica*.

Taxonomie: The scientific classification of organisms in an ordered system that indicates natural relationships (see also 'Schema of taxonomic names' below).

Underutilized species: for the purpose of this publication, underutilized species are defined as species with underexploited potential for contributing to food security, health and nutrition, income generation and environmental services (GFU, 2007). However, "underutilized species" is not a well-defined term and it depends on the geographical, social, economic and temporal aspects and includes a wide range of wild, traditional, indigenous and local foods. Often, their taxonomic identification is not complete, especially below species level. For this document, only foods reported in the reference list for underutilized foods for food biodiversity will contribute to the Nutritional Indicators for Biodiversity. This list and the definition for underutilized foods contributing to the Nutritional Indicators for Biodiversity can be found on the INFOODS website http://www.fao.org/infoods/biodiversity/index_en.stm.

Variety: a naturally occurring subdivision of a plant species, within a single botanical taxon of the lowest known rank, with distinct morphological characteristics and given a Latin name according to the rules of the International Code of Nomenclature; a taxonomic variety is known by the first validly published name applied to it, so that nomenclature tends to be stable (cf. cultivar; pathovar); the taxonomic naming convention is to append "var." and the Latin name in italic to the species name, for example *Malus angustifolia* (Ait.) Michx. var. *angustifolia* – southern crabapple; a variety will have an appearance distinct from other varieties, but will hybridize freely with other varieties if brought into contact; varieties are usually geographically separate from one another; to plant breeders, at least in countries that are signatories to the International Convention for the Protection of New Varieties of Plants (UPOV Convention), "variety" or "plant variety" is a legal term; in zoological nomenclature, the only officially regulated rank below that of species is subspecies; forms and morphs are used instead of varieties if needed, but are unregulated by the International Commission on Zoological Nomenclature (ICZN). In bacteriological nomenclature, "variety" and "subspecies" are used interchangeably.

Wild foods: the definition is adapted from the first *State of the World's Plant Genetic Resources for Food and Agriculture* report (FAO, 1997): wild plants, animals and insects, that are not cultivated or reared in captivity, are part of the minor crops and underutilized species, and include roots and tubers, vegetables and leafy vegetables, fruits, insects, amphibians, reptiles, birds and mammals gathered for food.

SCHEMA OF TAXONOMIC NAMES

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

Notes*:*
Cultivar names should always be enclosed in single quotation marks ' ' even though it is not always done. The cultivar name should not be confused with the author's name of the taxonomic name, e.g., L. or Linn. (for Linnaeus), Roem, (L.) Roem, Bosc., Roxb., Swartz, Mill., Muell., Nordmann, which can be followed by a year. It is possible to check the author names through The International Plant Names Index – Author Query (available at http://www.ipni.org/ipni/authorsearchpage.do).

Some species, subspecies or varieties can be followed by a form name (abbreviated to f.), e.g., *M. moschata* f. *alba* or *Narcissus romieuxii* ssp. *albidus* var. *zaianicus* f. *lutescens*.

Variety, cultivar and breed are the lowest taxonomic level, except for taxonomic varieties considered as foods (which are normally species) that can be further described with an additional cultivar name (see examples in **Table 1**). The taxonomic name of these common foods always includes 'var.', e.g., clementine, nectarine, peppers, mange-tout peas and foods of the Brassica genus e.g., cauliflower, broccoli, cabbage, Brussels sprouts. Therefore, Cabbage January King (*Brassica oleracea* var. *capitata* 'January King') contributes to Indicators 1 and 2 because it has a cultivar name in addition to the variety name while Cabbage (*Brassica oleracea* var. *capitata*) would not.

ANNEX 8

RESOURCES

- **Taxonomic Web sites**
  - Plants
    - http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl
    - http://mansfeld.ipk-gatersleben.de/
    - http://www.plantnames.unimelb.edu.au/Sorting/Frontpage.html
    - http://www.seedtest.org/en/home.html
    - http://plants.usda.gov/
    - http://epic.kew.org/index.htm
  - Fish
    - http://www.fao.org/figis/servlet/static?dom=org&xml=sidp.xml&xp_lang=en&xp_banner=fi
    - http://www.fao.org/fi/website/FISearch.do?dom=species
    - http://www.fishbase.org/home.htm
    - http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/regulatoryfishencyclopediarfe/default.htm
    - http://www.nativefish.asn.au/taxonomy.html
    - http://www.nativefish.asn.au/fish.html
  - Plants, animals, fish
    - http://www.ncbi.nlm.nih.gov/sites/entrez?db=Taxonomy
    - http://www.cbif.gc.ca
    - http://www.sp2000.org/

- **Gene bank databases**
  - http://www2.bioversityinternational.org/Information_Sources/Species_Databases/Species_Compendium/

- **Other resources**
  - http://www.underutilized-species.org/institutional_mapping/Species%20and%20Countries.xls
  - http://www.ipni.org/ , by author: http://www.ipni.org/ipni/authorsearchpage.do
  - http://www.bgbm.org/iapt/nomenclature/code/SaintLouis/0001ICSLContents.htm
  - http://www.ishs.org/icra/index.htm
  - http://apps.rhs.org.uk/rhsplantfinder/plantnaming/hownameswork.asp
  - Module 12 on Biodiversity in the Food Composition Study Guide – Volume 1 Questions and Exercises / Volume 2 Answers. Available at: http://www.fao.org/infoods/publications_en.stm
  - CINE's Arctic Nutrient File. Available at: http://www.mcgill.ca/files/cine/Traditional_Food_Composition_Nutribase.pdf
  - http://www.twentyten.net/.

ANNEX 9

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ANNEX 10
SUPPORT FOR COUNTRIES TO GENERATE, COMPILE AND DISSEMINATE CULTIVAR-SPECIFIC NUTRIENT COMPOSITION DATA, AND THE RELATIVE PRIORITY OF OBTAINING CULTIVAR-SPECIFIC DIETARY CONSUMPTION DATA

CGFRA/WG-PGR-3/05/5

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October 2005

منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Organización de las Naciones Unidas para la Agricultura y la Alimentación

Item 7 of the Draft Provisional Agenda
COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE
WORKING GROUP ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE
Third Session
Rome, 26 – 28 October 2005
SUPPORT FOR COUNTRIES TO GENERATE, COMPILE AND DISSEMINATE CULTIVAR-SPECIFIC NUTRIENT COMPOSITION DATA, AND THE RELATIVE PRIORITY OF OBTAINING CULTIVAR-SPECIFIC DIETARY CONSUMPTION DATA

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1. INTRODUCTION

1. At its Tenth Regular Session, the Commission on Genetic Resources for Food and Agriculture (the "Commission") requested the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture (the "Working Group") to "provide guidance to FAO on how it could best support countries, on request, to generate, compile and disseminate cultivar[1]-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, as presented in document, *Report from FAO on its Policies, Programmes and Activities on Agricultural Biological Diversity: Cross-Sectoral Matters"*.[2] This document has been prepared to address that request.

2. ROLE OF BIODIVERSITY IN NUTRITION AND FOOD SECURITY

2. For many years, FAO has considered food composition and food consumption data to be important to agriculture, health, the environment and trade. In recent years, FAO prepared a Background Study Paper for the Commission in April 2001 on the nutritional value of some crops that were under discussion in the negotiation of the *International Treaty on Plant Genetic Resources for Food and Agriculture*[3]. FAO also published reports and background papers on *Nutritional contribution of rice and impact of biotechnology and biodiversity in rice-consuming countries*[4] and on *Analysis of food composition data on rice from a plant genetic resources perspective*[5] for the International Rice Commission and the International Year of Rice. An extensive listing is provided in the associated information document entitled "FAO's activities in nutrition and biodiversity"[6].

3. In February 2004, Decision VII/32 of the *Convention on Biological Diversity*'s Conference of the Parties (CBD-CoP)[7] noted the linkage between biodiversity, food and nutrition and the need to enhance sustainable use of biodiversity to combat hunger and malnutrition, and thereby contribute to Target 2 of Goal 1 of the Millennium Development Goals[8]. The CBD-CoP requested the CBD's Executive Secretary, in collaboration with FAO and the International Plant Genetic Resources Institute (IPGRI), and taking into account ongoing work, to undertake the necessary consultations and bring forward options for consideration by the CoP at its Eighth Meeting for a ***Cross-cutting initiative on biodiversity for food and nutrition*** (IBFN) within the CBD's existing programme of work on agricultural biodiversity. The CBD's Executive Secretary was requested 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 achieving Target 2 of Millennium Development Goal 1 and other relevant Millennium Development Goals.

4. A consultation on the IBFN was held in Brasilia, on 12-13 March 2005, jointly hosted by FAO, the Executive Secretary of the CBD, and the International Plant Genetic Resources Institute (IPGRI), in order to explore ways to enhance synergies and integrate biodiversity concerns into existing food and nutrition initiatives, in collaboration with other organizations and their initiatives.

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[1] For the purposes of this document, the terms "cultivar" and "variety" should be considered synonymous.
[2] CGRFA-10/4/10.2 para.24.
[3] Background Study Paper No.11, *Nutritional Value of Some of the Crops under Discussion in the Development of a Multilateral System,* April 2001, is available on the Commission's web site at http://www.fao.org/ag/cgrfa/docs.htm#bsp
[4] *Proceedings of the 20th Session of the International Rice Commission*, Bangkok, Thailand, 2003. FAO, Rome, p 59-69.
[5] *Food Chemistry* (2003).80:589-596
[6] CGRFA/WG-PGR-3/05/Inf.9.
[7] The text is posted at http://www.biodiv.org/decisions/
[8] To halve, between 1990 and 2015, the proportion of people who suffer from hunger.

5. As specified in the Report of the IBFN[9], FAO and other organizations and initiatives in the scientific community (e.g. the International Union of Nutritional Sciences (IUNS), the United Nations University (UNU), the International Food Data Conference (IFDC) and the United Nations Standing Committee on Nutrition (SCN)), recognized that biodiversity at the species and variety levels provides the basic components of nutrition, including energy, proteins and amino acids, fats and fatty acids, minerals and vitamins, as well as important bioactive "non-nutrients" (e.g. antioxidant phytochemicals). This diversity, including varietal diversity, of fruits, leafy vegetables and other plants and algae is particularly important, but fish and other animal products are also important. Diversity is of particular significance for indigenous communities and for poor and vulnerable communities, especially in times of shortages of major crops. In addition to its role in supporting and sustaining food production, biodiversity, by underpinning dietary diversity, has a role to play in addressing both undernutrition associated with poverty, and obesity-related diseases associated with urbanization, in developed and developing countries.

6. Similarly, in the Report of the IBFN, FAO and other organizations and initiatives in the scientific community recognized that species and varietal differences in nutrient composition can be significant, and that cultivar-specific food composition and consumption data will form the evidence base by which other activities related to nutrition and biodiversity can most effectively be undertaken.

3. GENERATION, COMPILATION AND DISSEMINATION OF CULTIVAR-SPECIFIC NUTRIENT COMPOSITION DATA

7. Many factors are known to affect the nutrient content of foods, including climate, geography and geochemistry, agricultural practices such as fertilization, and the genetic composition of the cultivar. To date, cultivar-specific differences have received the least attention among these. In the past, generic food composition data were considered sufficient for most purposes. However, the usefulness of cultivar-specific composition data is becoming increasingly acknowledged.

8. Sources of new data on cultivar-specific nutrient composition include scientific literature, the International Network of Food Data Systems, regulations governing import/export and substantial equivalence, and analysis of indigenous and wild foods.

9. Recent compositional research has provided data to confirm the micronutrient superiority of some lesser-known cultivars and wild varieties over some more widely-utilized cultivars. For example, Huang and co-workers (1999)[10] reported that sweet potato cultivars in some Pacific Islands differed in their beta carotene content by a factor of 60, yet the low beta carotene varieties were promoted by the agriculture extension workers. Vitamin A deficiency diseases are still pervasive in certain parts of the Pacific, and therefore cultivar-specific nutrient data should be fundamental to related agriculture and nutrition policies and interventions. Promoting indigenous crops rich in micronutrients such as vitamin A precursors has an important role in promoting nutrition in parts of Sub-Saharan Africa, given the high prevalence of HIV/AIDS[11] . Similar papers on the nutrient content of various plant genetic resources have also been published.

10. These trends have been documented by the Secretariat for INFOODS, the International Network of Food Data Systems, operated by FAO in collaboration with the United Nations University. INFOODS, through its standards development, its network of Regional Data Centres[12] and the *Journal of Food*

[9] Report of the IBFN is available on the CBD web site at http://www.biodiv.org/doc/meeting.aspx?mtg=IBFN-01

[10] Content of Alpha-, Beta-Carotene, and Dietary Fiber in 18 Sweetpotato Varieties Grown in Hawaii. *Journal of Food Composition and Analysis, Volume 12, Issue 2, June 1999, Pages 147-15.* A. S. Huang, L. Tanudjaja and D. Lum.

[11] FAO, 2002. State of Food Insecurity in the World.

[12] Regional Data Centres in the FAO/UNU INFOODS network include the following: AFROFOODS, ASEANFOODS, CEECFOODS, EUROFOODS, LATINFOODS, MEFOODS, NEASIAFOODS, NORAMFOODS, OCEANIAFOODS, SAARCFOODS. In addition, there are several sub-regional Data Centres.

Composition and Analysis, promotes the importance of identifying and disseminating nutrient profiles of food plants and animals, including wild and under-utilized species and intra-specific data.

11. Absence of cultivar-specific food composition data has at times constituted a technical barrier to trade. Most potential export markets for unique species and cultivars require or encourage nutrient composition data for food labels (e.g. "Nutrition Facts" in the USA) and point-of-purchase materials. Many countries have experienced detentions and confiscations of products because compositional data required by the importing countries' legislation were not provided or were considered to be incorrect.

12. In many countries, voluntary or mandatory safety assessment schemes have been introduced for genetically modified organisms (GMOs) used as food. Such safety assessments usually use the concept of "substantial equivalence": the new food is compared to conventional foods to assess similarities and differences that may impact on the health of consumers[13]. Better knowledge on the nutritional composition of conventional foods (existing cultivars) will facilitate the conduct of safety assessments of GMOs[14],

13. The recommendations of the International Rice Commission's 20th Session[15] provided some important directions for food composition data generators and compilers. The International Rice Commission recommended that existing biodiversity of rice varieties and their nutritional composition needs to be explored before engaging in transgenic research; that nutrient content needs to be among the criteria used in cultivar promotion; and that cultivar-specific nutrient analysis and data dissemination should be undertaken systematically.

14. Knowledge of the nutrient composition of the native diet of endangered animal species is an important requirement for protecting them. In some countries, scientists have studied the nutrient composition of the original diets of birds in their native habitats, to ensure that the same nutrients in the same quantities were being supplied in the artificial diets on their offshore island sanctuaries and other protected, artificial habitats.

15. Climate change and other environmental phenomena affect the nutrient content of foods in many ways[16]. Ozone depletion has been shown to modify beta-carotene and other carotenoids and bioactive non-nutrients, while global warming has been shown to effect carbohydrate and fatty acid profiles[17]. The fat content of fish has been used as a marker in charting the climatic phenomenon of El Niño[18]. However, more data on diversity among genetic resources needs to be generated and documented before such changes related to climatic phenomenon can be elucidated.

16. FAO has reported that wild plants, animals, tree foods and forest foods are essential for many rural households[19]. At least one billion people are thought to use them. For instance, in Ghana, the leaves of over 300 species of wild plants and fruits are consumed. In rural Swaziland, wild plant foods provide a greater share of the diet than domesticated cultivars. In India, Malaysia and Thailand, about 150 wild plants have been identified as sources of emergency food. In developed countries, wild food plants also

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[13] The joint FAO/WHO Codex Alimentarius Commission adopted guidelines for the conduct of food safety assessments of GMOs and is pursuing its work in this area.
[14] OECD has been publishing a series of "consensus documents" on a number of food plants.
[15] FAO, 2002. Report of the International Rice Commission 20th Session (23–26 July 2002, Bangkok), FAO, Rome.
[16] USDA. Agricultural Research Service (2001). National Program, Global Change Annual Report: FY 2001.
[17] Seasonal variations of lipid fatty acids of boreal freshwater fish species. Comparative Biochemistry and Physiology B 88:905-909, 1987. Ågren, J., Muje, P., Hänninen, O., Herranen, J., Penttilä, I.
[18] Fat Content of Peruvian Anchovy (*Engraulis ringens*), After "El Niño" Phenomenon (1998—1999). Journal of Food Composition and Analysis, Volume 15, Issue 6, December 2002, Pages 627-631. María Estela Ayala Galdos, Miguel Albrecht-Ruiz, Alberto Salas Maldonado and Jesús Paredes Minga
[19] FAO, 1996. World Food Summit, Food for All. 13-17 November 1996. http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/x0262e/x0262e04.htm

have an important place. In Italy, mushroom and forest-fruit gathering is popular, and throughout North America and Europe, wild foods feature on menus of the most fashionable restaurants.

17. Many wild plants have the potential to become foods of the future -- useful parents in breeding programs, convenient sources of income, and the vehicles for improved nutrition and increased food supply. Nutrient composition varies among wild plant ecotypes as well as crop cultivars. Some data have been generated, which mainly have been disseminated through specialised scientific publications.

18. Integrating biodiversity and nutrition can contribute to the achievement of Millennium Development Goal 1 (Target 2)[20], Goal 7[21] and related goals and targets, and thereby raise awareness of the importance of biodiversity, its conservation and sustainable use.

19. Through FAO/UNU INFOODS, in collaboration with other organizations, food composition courses are conducted for training in laboratory techniques and practices for generating data and computer systems for compiling data, although they do not always provide training at the cultivar-specific level.

20. Most countries have food control laboratories that undertake analyses for heavy metals, pesticide residues and other chemical contaminants. Some countries have established laboratories that can undertake both chemical food safety analyses and nutrient analyses, since sampling protocols, instruments, quality assurance and quality control systems are similar or identical. Thus, these combined food-control / food-composition laboratories are capable of efficiently generating cultivar-specific nutrient composition data and data on chemical contaminants.

21. Many developing countries and countries in transition are unable to devote resources to strengthening laboratory capabilities and are therefore not able to systematically undertake the nutrient analyses of individual cultivars. However, many countries and regions in the INFOODS network have developed small projects, generating, compiling and disseminating nutrient data on their plant biodiversity. Through FAO Technical Cooperation Projects, food composition activities have been funded to strengthen laboratory capability for nutrient analyses of indigenous species and varieties, to provide funds for sampling and analyses, and to prepare, print and disseminate food composition tables and databases. At a CEECFOODS[22] meeting held on 26 -27 July 2005, the member countries requested FAO's assistance in order for them to be able to generate more nutrient data on local cultivars and varieties and to mainstream those data by including them in national food composition tables and databases to ensure widespread availability.

4. RELATIVE PRIORITY OF OBTAINING CULTIVAR-SPECIFIC DIETARY CONSUMPTION DATA

22. In the past, as in the case of nutrient composition data described above, generic food consumption data were considered sufficient for most purposes, but increasingly, the usefulness of greater detail in dietary consumption, including cultivar-specific data and an ecosystem approach, is becoming acknowledged as important for understanding diet-related morbidity and mortality.

23. Agricultural production now provides enough food to supply the world with its dietary energy requirement, on a global basis. However, many millions of people with adequate, or even surplus, energy intake suffer from micronutrient deficiencies. A diet low in diversity is capable of providing adequate energy, but biodiversity should be utilized to provide the spectrum of micronutrients and other beneficial food components necessary for health.

24. A global epidemic of obesity and its associated diseases is emerging as increasingly urbanized people adopt diets which are higher in energy, and lower in diversity of fruits and vegetables than those consumed traditionally (this is known as "the nutrition transition"). Many countries now face the so called "double burden of malnutrition": the simultaneous challenges of high prevalence of undernourishment and underweight, and the increasing prevalence of overweight/obesity with its accompanying chronic diseases.

[20] See footnote 4 above.
[21] Ensure environmental sustainability.
[22] CEECFOODS is the INFOODS Regional Data Centre for Central and Eastern European Countries.

In both groups, high prevalence of micronutrient deficiencies is found. By underpinning dietary diversity, biodiversity has a particular role to play in addressing micronutrient deficiencies, and also the poverty- and urbanization-related problems of undernutrition and obesity, in both developed and developing countries.

25. Food consumption survey projects are undertaken, with representative sampling at the sub-national and/or national levels, in order to ascertain the adequacy of nutrient intakes. Current survey instruments and methods generally do not address cultivar-specific intakes, and thus prevent evaluation of this level of dietary biodiversity. However, recent studies have shown that survey respondents are capable of reporting intakes of species and varieties by local names[23].

26. As more cultivar-specific compositional data become available, the more important it becomes to modify the methods and instruments in order to capture cultivar-specific consumption in individual and household surveys. Knowledge of composition and consumption of intra-species diversity may be useful in the development of food-based dietary guidelines and nutrition education programmes for populations.

27. In summary, the absence of cultivar-specific composition and consumption data limits our ability to assess the value of these cultivars and their importance to individual, household and national food security, as well as to trade and the environment sector. Therefore, where detailed dietary consumption methods are used (e.g. weighed portions, 24 hour recall, diet histories), as opposed to methods that only record by food groups, clusters or generic food lists, then collection of cultivar-specific dietary consumption data is feasible and could be considered a high priority.

5. GUIDANCE REQUESTED FROM THE WORKING GROUP ON PLANT GENETIC RESOURCES

28. The Working Group may wish to consider recommending that the Commission request FAO to prepare a draft action plan to better support countries to generate, compile and disseminate cultivar-specific nutrient composition and consumption data. It would include the following activities:

a) assisting INFOODS Regional Data Centres in their efforts to increase the quality and quantity of food composition data on individual cultivars and under-utilized species, and to compile and disseminate those data in national and regional food composition tables and databases (see para.10);

b) enabling the *Journal of Food Composition and Analysis* to provide an international, peer-reviewed forum for publishing high quality scientific papers on nutrition and biodiversity, with particular attention to papers from developing countries (see para.10);

c) developing a biodiversity training module for courses on nutrient composition, focusing largely on developing sampling plans in order to generate cultivar-specific data (see para.19);

d) providing support for extending analytical capabilities and accreditation for nutrient analyses for existing food control chemical laboratory facilities, in order to more economically and efficiently generate cultivar-specific nutrient data (see paras.20-21);

e) increasing the coverage of FAO's Technical Cooperation Projects on national and regional food composition to strengthen laboratory capacity for nutrient analyses, in order to generate, compile and disseminate cultivar-specific nutrient data for national food composition databases and published food tables (see para. 21);

[23] See for example "Field testing of plant genetic diversity indicators for nutrition surveys: rice-based diet of rural Bangladesh as a model". *Journal of Food Composition and Analysis, Volume 18, Issue 4, June 2005, Pages 255-268.* G. Kennedy, O. Islam, P. Eyzaguirre and S. Kennedy.

f) organizing national level sensitization, advocacy, and policy workshops in order for countries to appreciate undertaking such activities, thereby supporting them in their proposals for projects in the area of food composition and consumption, in the context of agricultural biodiversity, and publishing country-specific appropriate communication materials (see paras 24-25);

g) conducting an expert consultation or technical workshop on addressing biodiversity in consumption survey methodologies, including an ecosystem approach to population sample stratification (see paras 25-26); and

h) mainstreaming food composition biodiversity data into nutrition education, food security, emergency preparedness, community nutrition, indigenous knowledge and culture activities, and other applied nutrition projects and programmes.

29. The Working Group may wish to propose that the Commission be made aware of the progress of the ***Cross-cutting initiative on biodiversity for food and nutrition*** (IBFN) within the existing programme of work on agricultural biodiversity of the CBD, and in particular FAO's activities in this regard.

ANNEX 11

EXTRACT OF THE REPORT CGRFA-11/07/10

Report of the Third Session of the Intergovernmental Technical Working Group on Plant Genetic Resources
(See at http://www.fao.org/AG/cgrfa/cgrfa11.htm)

VI. SUPPORT FOR COUNTRIES TO GENERATE, COMPILE AND DISSEMINATE NUTRIENT COMPOSITION DATA OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

28. The Working Group considered the document Support for countries to generate, compile and disseminate cultivar-specific nutrient composition data, and the relative priority of obtaining cultivar-specific dietary consumption data,[8] and the associated information document, FAO activities in nutrition and biodiversity.[9] The Working Group noted FAO's long-standing activities in food composition and consumption in relation to agriculture, health, environment and trade.

29. The Working Group recommended that the Commission request FAO to prepare a draft action plan to better support countries to generate, compile and disseminate cultivar-specific nutrient composition and consumption data. The draft action plan should focus upon:

a) Generating baseline nutritional data for local, regional and/or specialty foods, from under-utilised crops, species utilised by local and indigenous communities, and wild food plants, taking into account local customs on food preparation. This work should be carried out consistent with national law. The species and target nutrients should be carefully chosen and sampling plans carefully formulated;

b) Cataloguing and compiling existing cultivar-specific nutrient data into more readily accessible databases or publications;

c) Identifying germplasm and generating experimental crop populations with very high and very low levels of "bioactive compounds" that may be useful for testing hypotheses about whether such compounds are nutrients, and whether they are "bioavailable" when consumed;

d) Assisting countries, in particular developing countries, to build capacity to enhance the use of nutritional genetic diversity in breeding new cultivars of major crops;

e) Assessing genetic resources in relation to nutrient uptake and bioavailability of nutrients, with a view to improved sustainable agriculture;

f) Assisting INFOODS Regional Data Centres in their efforts to increase the quality and quantity of food composition data on individual cultivars and under-utilized species, and to compile and disseminate those data in national and regional food composition tables and databases;

g) Enabling the Journal of Food Composition and Analysis to provide an international, peer-reviewed forum for publishing high quality scientific papers on nutrition and biodiversity, with particular attention to papers from developing countries; and

[8] CGRFA/WG-PGR-3/05/5.
[9] CGRFA/WG-PGR-3/05/Inf.9.

h) Developing communications plans for information on nutritional values of different cultivars at the national, regional and international levels.

30. The draft action plan could also include the following, lower priority, activities:

a) Developing a biodiversity training module on nutrient composition, focusing largely on developing sampling plans in order to generate cultivar-specific data, which should be complementary to existing training courses;

b) Providing support to, and building capacity of, existing food control chemical laboratory facilities, to enable them to more economically and efficiently generate cultivar-specific nutrient data;

c) Increasing the coverage of FAO's Technical Cooperation Projects to strengthening laboratory capacity for nutrient analyses, in order to generate, compile and disseminate cultivar-specific nutrient data for national food composition databases and published food tables, in particular for under-utilised crops and cultivars developed by local and indigenous communities;

d) Organizing national level sensitization, advocacy, and policy workshops, thereby supporting countries in their proposals for projects in the area of food composition and consumption, in the context of agricultural biodiversity, and publishing country-specific communication materials;

e) Conducting an expert consultation or technical workshop on addressing biodiversity in consumption survey methodologies, including an ecosystem approach to population sample stratification; and

f) Mainstreaming food composition biodiversity data into nutrition education, food security, emergency preparedness, community nutrition, activities related to indigenous knowledge, and other applied nutrition projects and programmes, consistent with national law.

31. The Working Group considered that conducting broad-scale studies of cultivar-specific differences in nutrient content should have low priority, because of high costs, difficulties with logistics and feasibility, and in some cases, potentially limited scientific utility resulting from significant variation caused by environmental differences (during cultivation, storage, post-harvest processing) and by interactions between genotypes and environments.

32. The Working Group proposed that the Commission should be kept aware of the development of the Cross-cutting initiative on biodiversity for food and nutrition that would be carried out within the existing programme of work on agricultural biodiversity of the Convention on Biological Diversity, and in particular of the activities of FAO and the CGIAR that could be important in this regard (such as the Bio-fortification Challenge Programme).



















Biological diversity is the variety of life on Earth, from the simplest micro-organisms to complex ecosystems such as the rainforests of the Amazon. Biodiversity is important for nutrition and health, and can help to combat micronutrient deficiencies and other forms of malnutrition. This can only be done if the composition of foods is known and disseminated so that varieties and breeds with higher nutritional quality can be promoted.

The *Cross-cutting Initiative on Biodiversity for Food and Nutrition* has been established to measure, investigate and promote biodiversity and nutrition. Therefore, nutrition indicators need to be developed to address the three dimensions of biodiversity – ecosystems, the species they contain and the genetic diversity within species. The indicators will measure the food **composition** and **consumption** of cultivars, varieties, breeds and subspecies of commonly consumed foods, as well as underutilized, uncultivated, indigenous plant and animal species.

The second nutrition indicator for biodiversity is related to food consumption. It aims to report on progress regarding food consumption for biodiversity and will help us value and preserve our planet's existing biodiversity within well-managed ecosystems, with their many sources of nutritionally-rich foods.





ISBN 978-92-5-106731-4

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