

Partenariat pour la mobilisation de la diversité des filières  
Alimentaires traditionnelles pour une meilleure alimentation et santé  
au sein des pays membres de la CEDEAO  
*Ouagadougou, Burkina Faso, 5—6 Septembre 2007*

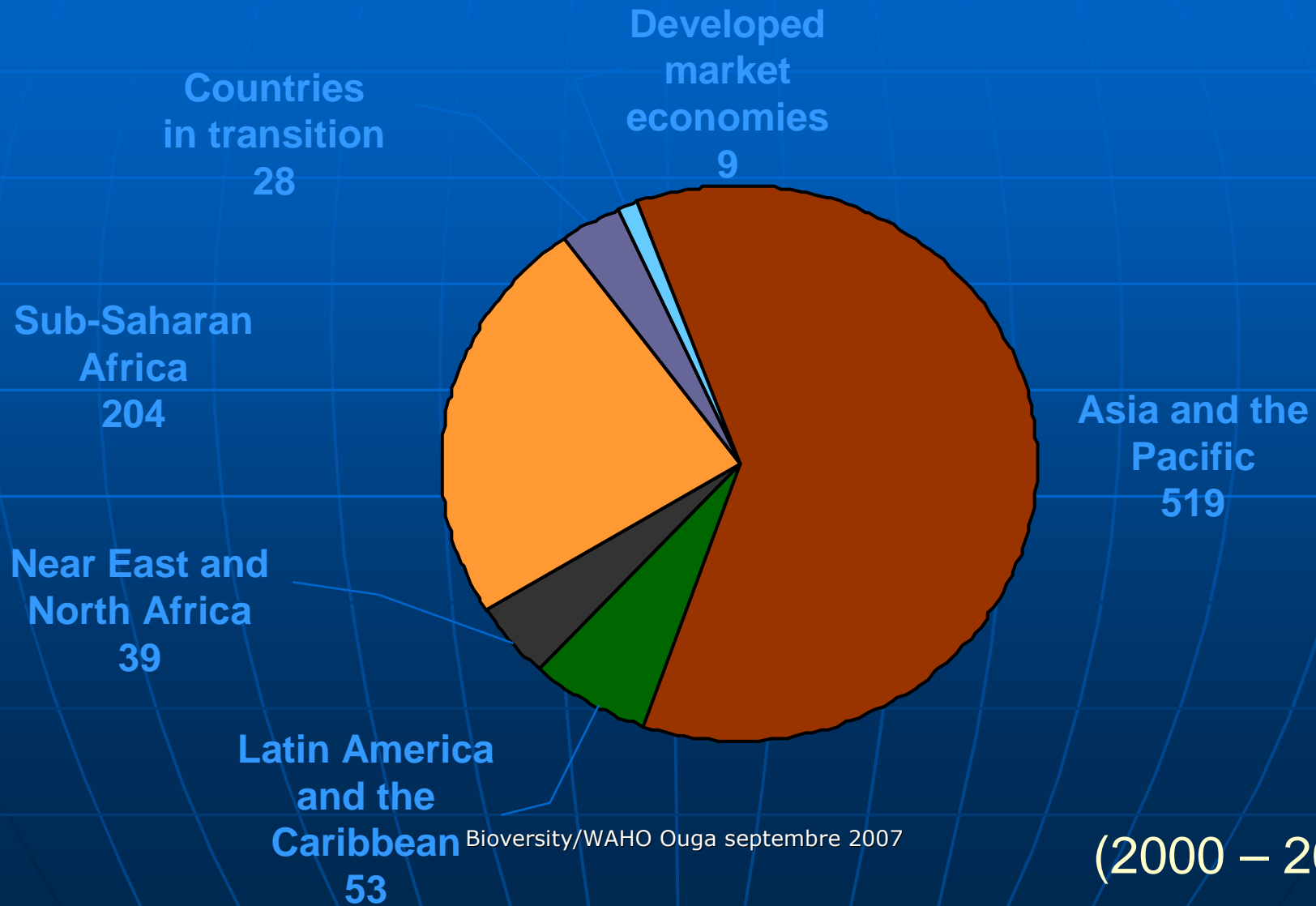
# Mise à jour sur les programmes de recherche et activités liés aux aliments traditionnels

*Revue sommaire de la littérature*

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# La situation nutritionnelle ne s'améliore pas en Afrique subsaharienne

# 852 million people are chronically undernourished

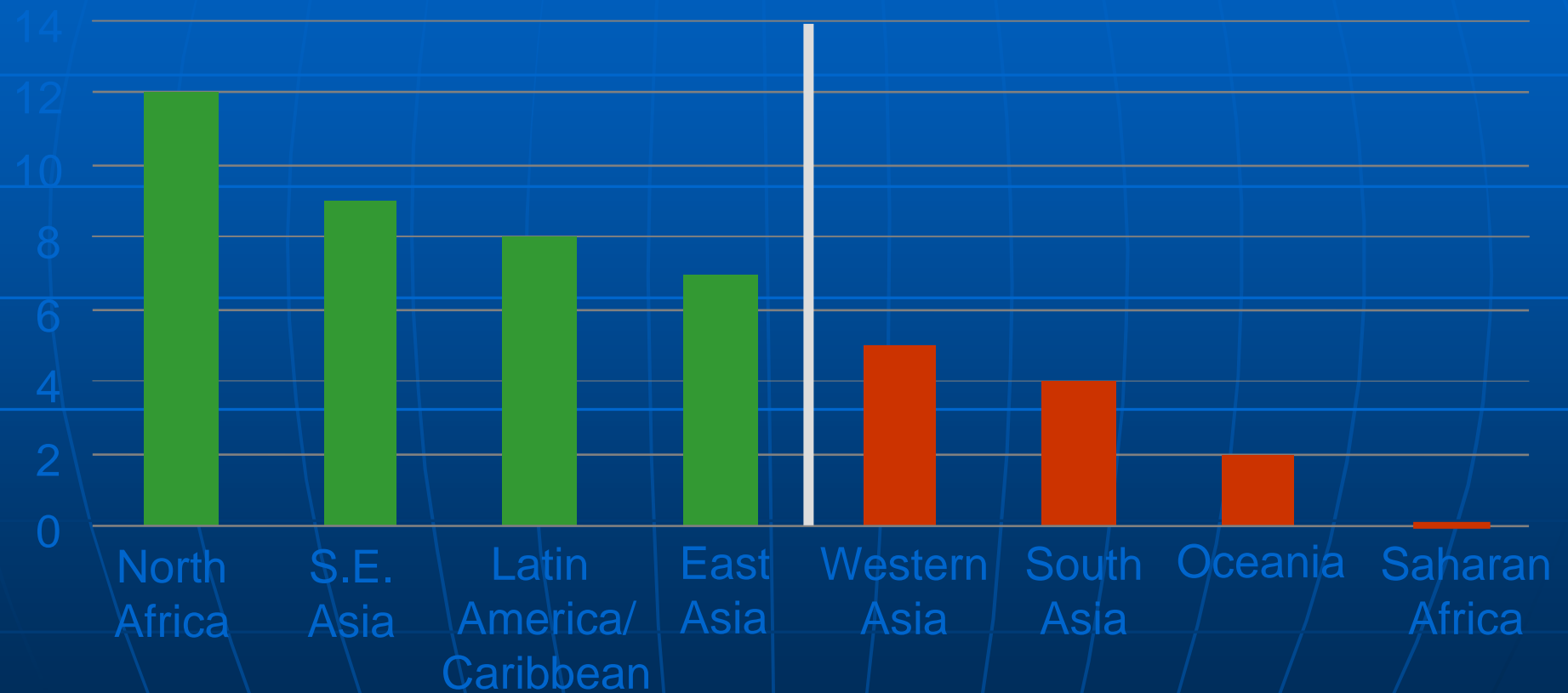


Bioversity/WAHO Ouga septembre 2007

(2000 – 2002)

# Progress in hunger reduction matches progress on other MDGs

Number of MDG targets on track (out of 18)

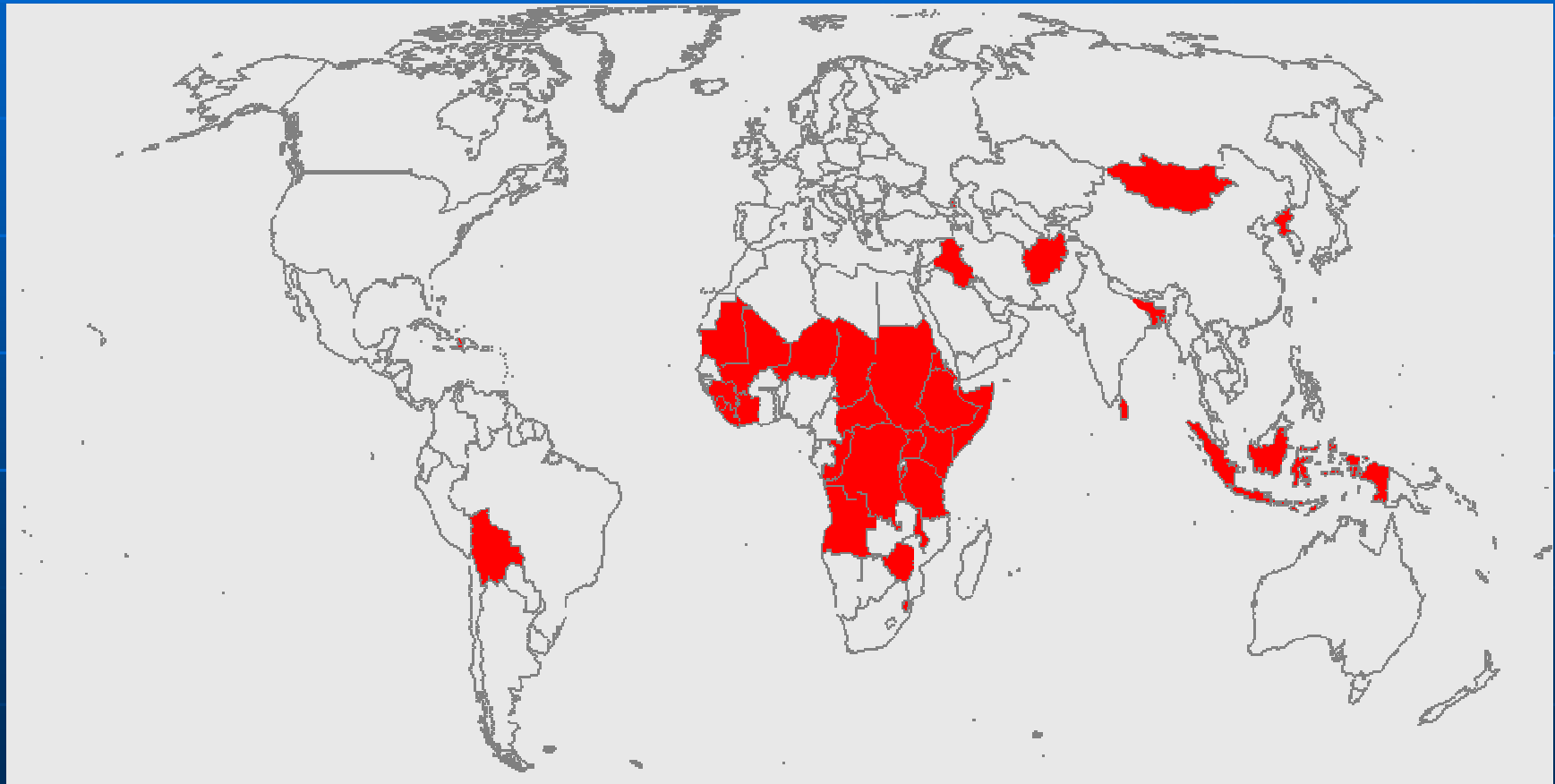


**Hunger reduction  
on track**

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**Hunger reduction  
not on track**

# Numerous countries face serious food shortages in 2005



October 2005

FAO

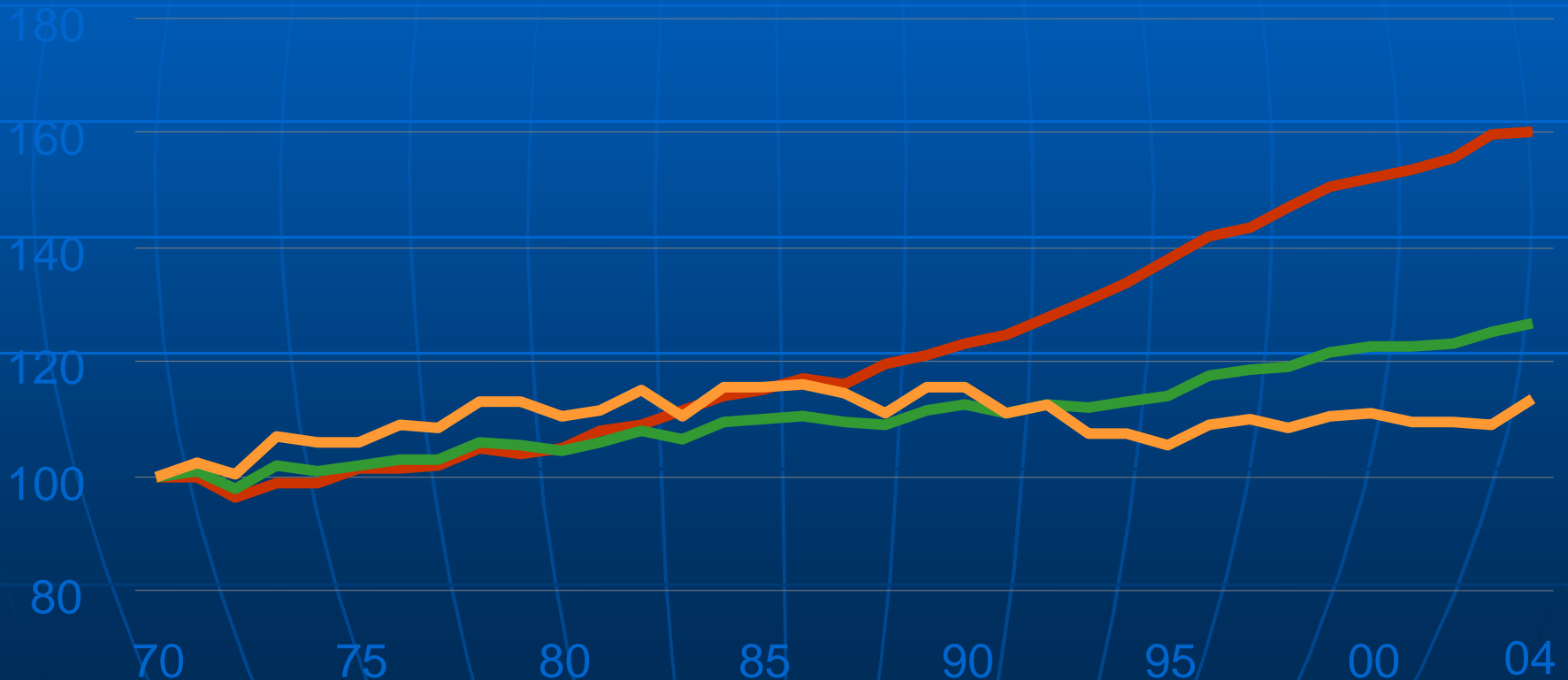
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5

# La production alimentaire mondiale per capita a beaucoup augmentée. Mais...

*Per caput food production*

Index (1970 = 100)

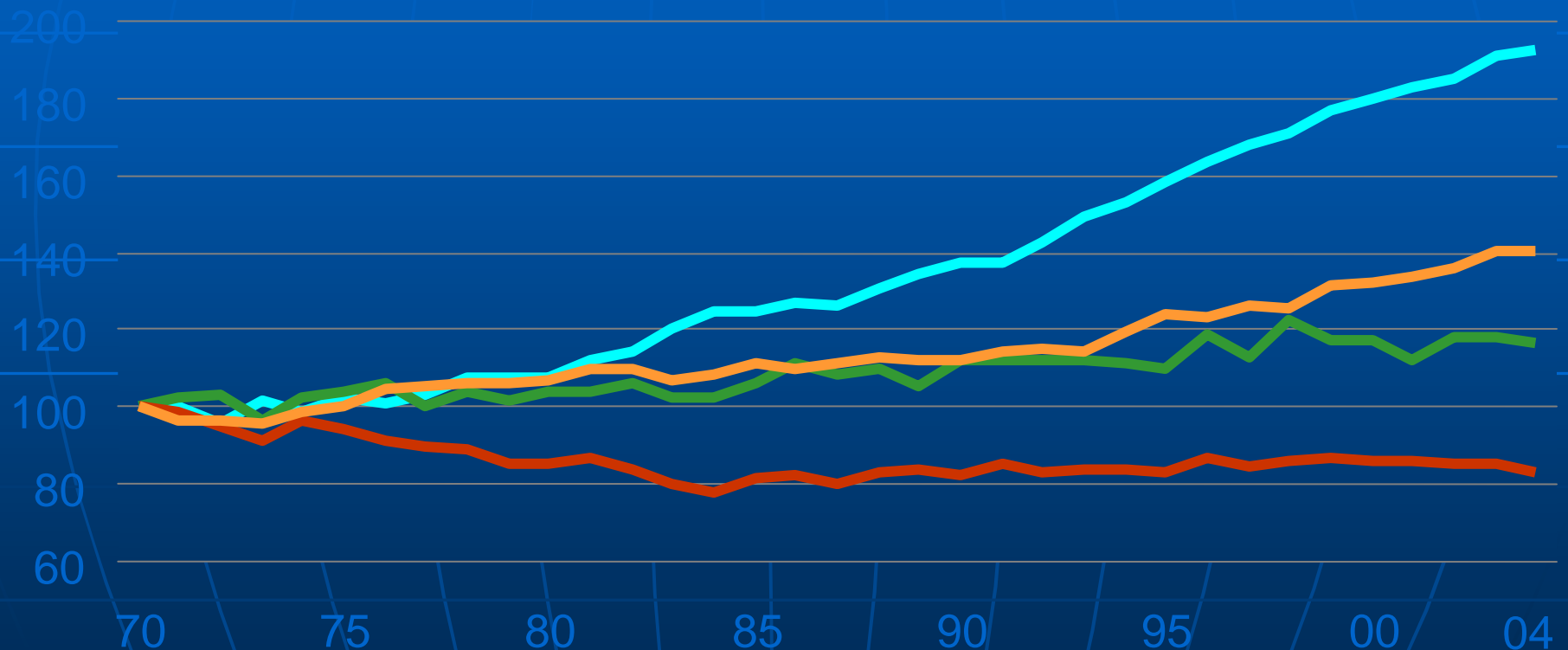


Bioversity/WAHO Ouga septembre 2007

# Au cours des 25 dernières années, la situation alimentaire ne s'est pas améliorée en Afrique subsaharienne

*Per caput food production*

Index (1970 = 100)



— Asia and the Pacific

— Near East and North Africa

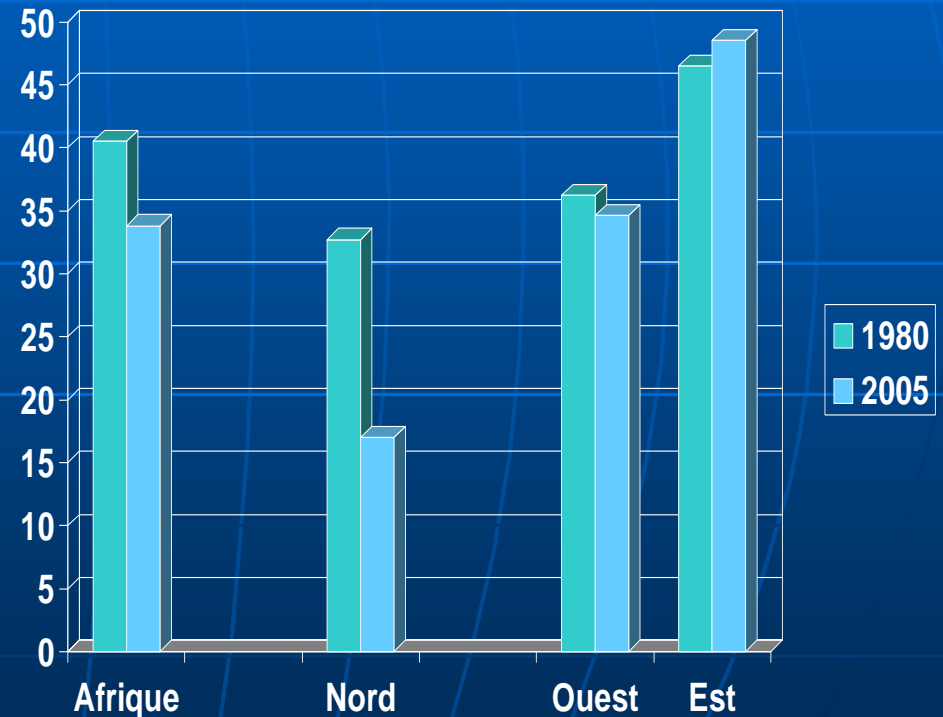
FAO — Sub-Saharan Africa

— Latin America and the Caribbean

Bioversity/WAHO Ouga septembre 2007

# Prévalence du retard de croissance chez les enfants d'âge préscolaire en Afrique entre 1980 et 2005

- En un quart de siècle, le nombre d'enfants qui ont un retard de croissance qui reflète une malnutrition chronique n'a presque pas bougé en Afrique de l'Ouest tandis qu'en Afrique de l'Est la situation s'est dégradée.





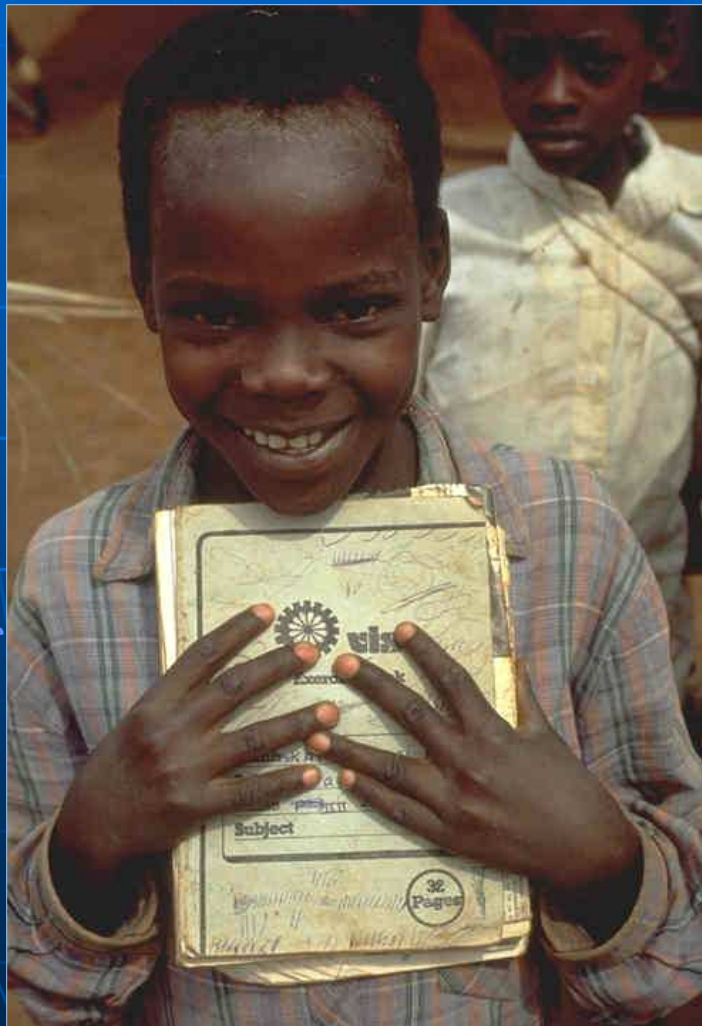
# INSECURITE ALIMENTAIRE

- L'insécurité alimentaire est la principale cause de la dégradation de l'état nutritionnel des populations.
- Elle regroupe l'ensemble des situations où des populations souffrent où risquent de souffrir des manifestations de la faim : MPE, carences en micronutriments.
- Elle peut être chronique ou temporaire



- La mauvaise situation alimentaire des populations qui ne cesse de se dégrader affecte leur état nutritionnel.
- Les enfants sont les premières victimes de cet état de fait et l'appréciation de leur état nutritionnel renseigne sur leur alimentation et leur environnement global.

# Impact de la malnutrition sur le développement économique et social



UNICEF/91-098/Schytte

**PERFORMANCES  
INTELLECTUELLES,  
PHYSIQUES ET  
PROFESSIONNELLES**



**DEVELOPPEMENT  
ECONOMIQUE ET  
SOCIAL**

# Malnutrition: Problème Invisible

*Signes  
extérieurs  
non visibles*

*Victimes non  
conscientes  
du problème*



Bioversity/WAHO Ouga s

# Conséquences des problèmes nutritionnels sur 3 secteurs clés

 **Santé**

 **Education**

 **Economie**

# Conséquences Fonctionnelles

- **Survie**
- **Santé**
- **Développement intellectuel**
- **Productivité**

# Quelques données sur le Sénégal

# Mortalité Attribuable à la Malnutrition Protéino-Energétique

130.000  
décès  
d'enfants  
de moins  
de 5 ans



UNICEF/94-1155/Pirozzi



# Carence en Vitamine A

- *55% des enfants*
- *30% des décès*
- *80.000 enfants morts*

Bioversity/WAHO Ouga



UNICEF/94-1173 Pirozzi

# Anémie par Carence en Fer

*58% des femmes  
sénégalaises*

*Contribue aux décès  
maternels*



# Carence en Iode

## Largement tributaire de:

- **Faible poids à la naissance**
- **Avortements**
- **Mortalité péri et neonatale**

# Carence en Iode

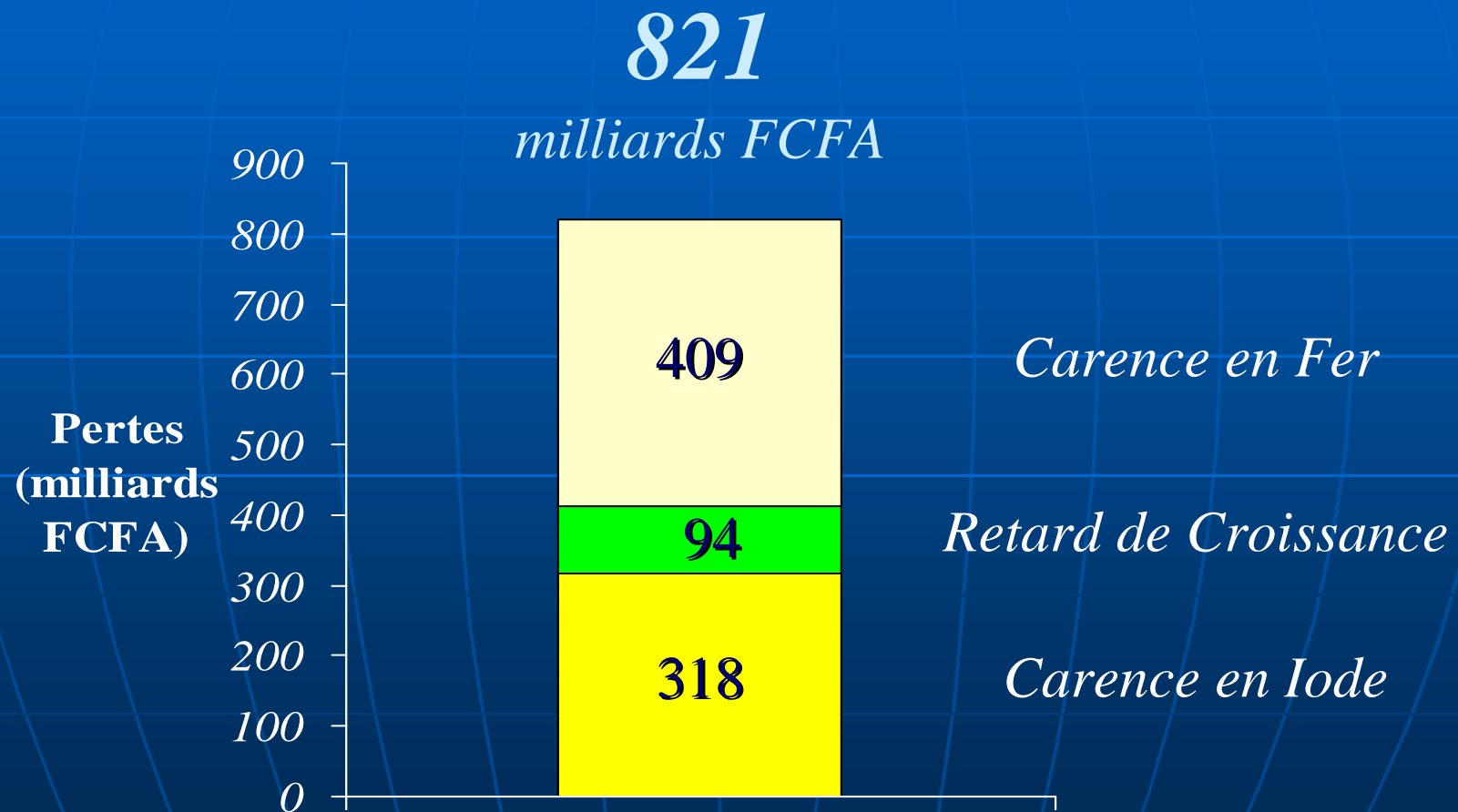
**Chaque année :** 70.000

nouveau-nés

**2002 – 2011 :** 700.000

nouveau-nés

# Pertes Totales: 2002-2011



# De nouvelles maladies émergentes liées à l'alimentation

- Obésité
- Hypertension artérielle
- Excès de cholestérol
- Maladies cardiovasculaires

# **Double fardeau de la malnutrition**

La riche biodiversité alimentaire peut contribuer à la réduction de ces maladies nutritionnelles si un véritable partenariat se développe pour assurer la promotion des aliments traditionnels pour une plus grande utilisation et commercialisation.



## Stakeholder Consultation: Cross-cutting initiative on biodiversity for food and nutrition Ipgri, Rome, Italy, February 16-17, 2006

- ...Many costs due to malnutrition are extremely high, while the wider use of agricultural biodiversity can efficiently deliver enormous benefits.
- Research is needed, for example to strengthen the links between dietary diversity and nutrition and health...

# RELATIONS ENTRE L'AGRICULTURE, LA SÉCURITÉ ALIMENTAIRE ET LA NUTRITION

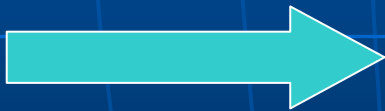
- Le lien le plus évident entre l'agriculture et la nutrition tient au fait que l'agriculture fournit la quasi-totalité de la nourriture que nous consommons.
- Un régime sain exige une **production locale diversifiée** d'aliments périssables (par exemple, légumes frais provenant de marchés ou de parcelles familiales) et **l'accessibilité d'articles commercialisés** à l'échelle régionale ou internationale.
- Les besoins alimentaires doivent donc être pris en considération pour la promotion de la production, de la technologie et des échanges commerciaux.

# Facteurs de bien-être nutritionnel directement liés à l'alimentation

- la quantité et la qualité du régime alimentaire, sa variété et sa composition et en particulier, la présence de produits d'origine animale et d'autres aliments riches en micronutriments et en énergie,
- de même que le mode de transformation et de préparation des aliments, la fréquence des repas et, pour les nourrissons, le rôle joué par l'allaitement.
- la qualité et la sécurité sanitaire des aliments consommés

# Développer les filières vivrières

- Accroissement de la sécurité alimentaire
- Meilleur régime alimentaire
- Revenus monétaires



**Meilleur état  
nutritionnel**

# La promotion des cultures vivrières traditionnelles sous-exploitées

- Les cultures vivrières traditionnelles sont celles que l'usage et la tradition font accepter comme sources alimentaires convenables et souhaitables par la communauté.
- Les populations rurales connaissent bien ces végétaux, savent les cultiver et les cuisiner, et en apprécient les plats.
- Ces plantes se répartissent en deux grandes catégories:
  - celles qui sont consommées comme aliments de base traditionnels, tels le manioc, l'igname, la plantain, la patate douce, les mils et le sorgho;
  - et celles qui entrent dans la composition de sauces et de condiments et qui comprennent un grand nombre de légumineuses, d'oléagineux, de fruits et de légumes.

Aliments traditionnels

Cultures vivrières  
traditionnelles

Ethnic foods

Indigenous foods

Functionnal foods

Ko dum  
woni ?



# Stakeholder Consultation: Cross-cutting initiative on biodiversity for food and nutrition

## Ipgri, Rome, Italy, February 16-17, 2006

### ■ Recommendations

#### ■ **Research and evidence**

- While the links between nutrition and health are well established, some consider those between diet and health and between agricultural biodiversity and dietary diversity and health to be less firm.
- Research focused on the health outcomes of diverse diets will be essential.
- **Broad reviews of the literature are needed to bring together what is known into a single, easily-accessible resource, which additionally will help to identify gaps in knowledge and to suggest specific case studies.**
- It is important to incorporate data specifically related to diversity, for example the nutrient content of identified crop varieties or animal breeds, into databases of food composition, and to ensure that such studies reflect local availability and techniques of food preparation.

# Stakeholder Consultation: Cross-cutting initiative on biodiversity for food and nutrition

Ipgri, Rome, Italy, February 16-17, 2006

## ■ Recommendations

- **Research and evidence (suite)**
- The role of markets, as a source of income for poor farmers and of better nutrition for shoppers and consumers, requires greater understanding and has implications for local, national, regional and international patterns of trade and policy.
- Action-oriented research can show how better access to greater agricultural biodiversity feeds through into more diverse diets, better nutritional status and ultimately improved health.
- **Complex investigations require multidisciplinary teams. Nutritionists, experts in agricultural biodiversity, health practitioners, social scientists, development workers and others should be encouraged to work together in the formation of core teams, developing in all research partners the capacity to handle such multifaceted issues. I**



# Etat des recherches à travers une revue documentaire sommaire

# Méthodologie

- Recherche documentaire
- Articles ayant trait aux aliments traditionnels mais en rapport avec la nutrition au sens large
- Consultations des bases de données
  - Agora
  - Hinari
- Période de référence : 2000 à 2007
- Non prise en compte des revues générales

# Limites de la démarche

- Prépondérance de la nutrition
- Revues nationales absentes
- Certaines recherches sont en cours et n'ont pas encore fait l'objet de publications
- Non exploitation des posters des congrès :
  - IUNS, Durban
  - IUFOST, Nantes

# **African Journal of Food, Agriculture, Nutrition and Development**

## **1. 70 articles**

**1. Biodiversité des plantes  
alimentaires**

**2. Composition chimique et l'effet  
des technologies**

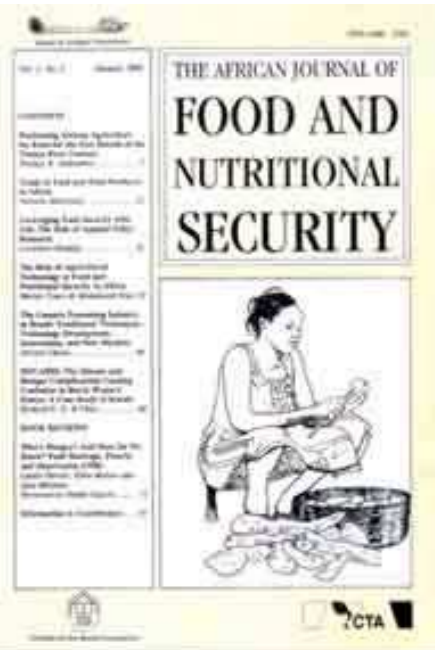
**3. Evaluation nutritionnelle**

**4. Biodisponibilité des  
micronutriments**

# African Journal of Biotechnology

## : 18 articles

1. cassava varieties in six rural communities in Anambra State, Nigeria
2. *In vitro* antimicrobial characteristics of bacteriocin- producing *Lactobacillus* strains from Nigerian indigenous fermented foods
3. The effects of different preservation methods on the quality of nunu, a locally fermented Nigerian dairy product
4. Proximate and microbial analyses of burukutu and pito produced in Ilorin, Nigeria
5. Optimization of process conditions for cassava (*Manihot esculenta*) *lafun* production
6. Physico-chemical and microbiological characteristics of honey from the sudano-guinean zone of West Cameroon
7. Comparative study on the microbiology and shelf life stability of palm wine from *Elaeis guineensis* and *Raphia hookeri* obtained from Okigwe, Nigeria
8. Effect of cooking and soaking on physical characteristics, nutrient composition and sensory evaluation of indigenous and foreign rice varieties in Nigeria
9. Nutritional potentials of some tropical vegetable leaf meals: chemical characterization and functional properties



# African Journal of Food and Nutritional Security

- Aucun article
- Arrêt du journal

# American Journal of clinical Nutrition

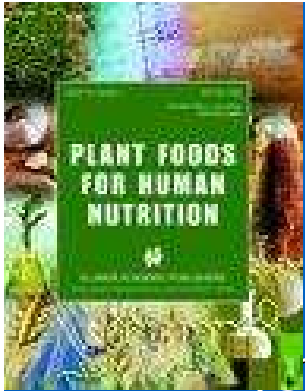
Iron bioavailability from maize and beans: a comparison of human measurements with Caco-2 cell and algorithm predictions

# International Journal of Food Sciences and Nutrition

1. **Frequency of consumption of cariogenic food items by 4-month-old to 24-month-old children: comparison between two rural communities in KwaZulu-Natal, South Africa**
2. **Coping strategies and nutritional health in rural Niger: recommendations for consumption of wild plant foods in the Sahel**
3. **Loss of residual cyanogens in a cassava food during short-term storage**
4. **Survival of some species of Salmonella and Shigella in mukumbi, a traditional Zimbabwean wine**
5. **Home-processing of the dishes constituting the main sources of micronutrients in the diet of preschool children in rural Burkina Faso**
6. **Entomophagy among the Luo of Kenya: a potential mineral source?**
7. **Effect of deep-fat frying on ascorbic acid, carotenoids and potassium contents of plantain cylinders**
8. **Feeding frequency and nutrient content of foods commonly consumed in the Iringa and Morogoro regions in Tanzania**

1. **Antinutritional factors and *in vitro* protein digestibility of improved haricot bean (*Phaseolus vulgaris* L.) varieties grown in Ethiopia**
2. **Schoolchildren's food consumption and dietary intake during the dry season in north-west Namibia**
3. **The status of wild food plants in Bulamogi County, Uganda**
4. **Nutritional value and acceptability of homemade maize/sorghum-based weaning mixtures supplemented with *rojo* bean flour, ground sardines and peanut paste**
5. **Combination of cassava flour cyanide and urinary thiocyanate measurements of school children in Mozambique**
6. **Activity pattern, energy intake and obesity among Nigerian urban market women**
7. **Feeding frequency and nutrient content of foods commonly consumed in the Iringa and Morogoro regions in Tanzania**
8. **The status of wild food plants in Bulamogi County, Uganda**





# Plant Foods for Human Nutrition : 17

1. Amino Acid, Mineral and Fatty Acid Content of Pumpkin Seeds (*Cucurbita spp*) and *Cyperus esculentus* Nuts in the Republic of Niger
2. Nutrient Content of Four Edible Wild Plants from West Africa
3. Effects of processing methods on the quality and acceptability of melon milk
4. Effects of processing on protein nutritive quality of coconut *Cocos nucifera* products
5. Knowledge, attitude and usage patterns of fermented and germinated complementary foods in Nigeria
6. Identification and nutrient composition of indigenous vegetables of Tanzania
7. Effect of heat treatment on the proximate composition, energy values, and levels of some toxicants in African yam bean (*Sphenostylis stenocarpa*) seed varieties
8. Fatty acid, amino acid, and trace mineral analyses of five weaning foods from Jos, Nigeria
9. The clinicopathologic significance of enriching grated cassava mash with red palm oil in the production of *gari*

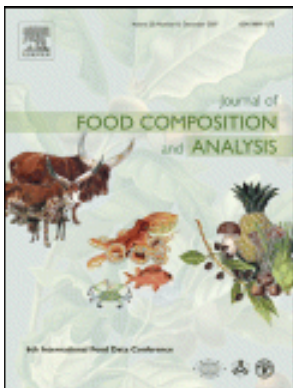
1. Effect of domestic processing on zinc bioavailability from ricebean (*Vigna umbellata*) diets
2. A preliminary study on the use of tempe-based formula as a weaning diet in Nigeria
3. Changes induced by infestation on some chemical properties of cowpea seeds
4. Proximate composition and selected physicochemical properties of the seed, pulp and oil of sour sop (*Annona muricata*)
5. The composition of pigeon peas (*Cajanus cajan* (L. Millsp.) grown in Botswana
6. Physical, morphological and chemical characteristics, oil recovery and fatty acid composition of *Balanites aegyptiaca* Del. kernels
7. Influence of storage on chemical, microbial and consumer acceptability of a milk-like product made from melon seeds
8. Traditional production, consumption and storage of Kunu " a non alcoholic cereal beverage

# British Journal of Nutrition

1. **Inter-household and intra-household patterns of fish and meat consumption in fishing communities in two states in Nigeria**
2. **Food security status in households of people living with HIV/AIDS (PLWHA) in a Ugandan urban setting**
3. **Effects of a high walnut and high cashew nut diet on selected markers of the metabolic syndrome: a controlled feeding trial**
4. **Food and macronutrient intake of male adolescent Kalenjin runners in Kenya**
5. **African plant foods rich in non-starch polysaccharides reduce postprandial blood glucose and insulin concentrations in healthy human subjects**
6. **Changes in fatty acid concentrations in tissues of African catfish, *Clarias gariepinus* Burchell, as a consequence of dietary carnitine, fat and lysine supplementation**

# Journal of the Science of Food and Agriculture : 8 articles

- **1. Consumer acceptability and sensory evaluation of a fermented cassava product (Nigerian fufu)**
- **2. Effects of phenolics in sorghum grain on its bitterness, astringency and other sensory properties**
- **3. Effects of traditional storage practices of small-scale organic farmers on potato quality**
- **4. Enhanced cholesterol- and triglyceride- lowering effect of West African green tea**
- **5. Cowpea cooking characteristics as affected by micronisation temperature: a study of the physicochemical and functional properties of starch**
- **6. The production of provitamin A-rich vegetables in home-gardens as a means of addressing vitamin A deficiency in rural African communities**
- **7. Nutritive value of a mixture of tigernut tubers (*Cyperus esculentus* L.) and baobab seeds (*Adansonia digitata* L.)**
- **8. The effect of applying GMP and HACCP to traditional food processing at a semi-commercial kenkey production plant in Ghana**



# JOURNAL OF FOOD COMPOSITION AND ANALYSIS

1. **Differences in micronutrients content found in cereals from various parts of Mali**
2. **Preliminary assessment of nutritional value of traditional leafy vegetables in KwaZulu-Natal, South Africa**
3. **Phytate, zinc, iron and calcium content of selected raw and prepared foods consumed in rural Sidama, Southern Ethiopia, and implications for bioavailability**
4. **Antioxidant and cyclooxygenase inhibitory activity of sorrel (*Hibiscus sabdariffa*)**
5. **Retention of  $\beta$ -carotene in boiled, mashed orange-fleshed sweet potato**
6. **Protein, carbohydrate and fibre in cereals from Mali—how to fit the results in a food composition table and database**
7. **Aroma compounds of essential oils of two varieties of the spice plant *Ocimum canum* Sims from northern Cameroon**

1. **Nutritional Composition of Some Wild Plant Foods and Honey Used by Hadza Foragers of Tanzania**
2. **The Effect of Locality and Season on the Composition of South African Whole Milk**
3. **Fatty Acid Composition of Fulani 'Butter Oil' Made from Cow's Milk\*1**
4. **12. Influence of Age, Farming Site, and Boiling on Pro-Vitamin A Content in Sweet Potato (*Ipomoea batatas*(L.) Lam.) Storage Roots\*1**
5. **Fluoride Content in Selected Food Items from Five Areas in East Africa\*1**
6. **Iodine Content in Fish and Other Food Products from East Africa Analyzed by ICP-MS\*1**
7. **The Nutritional Composition of Seeds from *Boscia senegalensis*(*Dilo*) from the Republic of Niger\*1**
8. **The Amino Acid and Mineral Content of Baobab (*Adansonia digitata L.*) Leaves**

# Food Chemistry : 3

- The effect of sorghum type and processing on the antioxidant properties of African sorghum-based foods
- Isolation, characterization and antioxidant capacity assessment of the bioactive compounds derived from *Hypoxis rooperi* corm extract (African potato)
- Comparative effect of boiling and solid substrate fermentation using the tempeh fungus (*Rhizopus oligosporus*) on the flatulence potential of African yambean (*Sphenostylis stenocarpa* L.) seeds

# Food Control : 1 article

Conceptualizing the human use of wild edible herbs for conservation in South African communal areas

# Journal of Environmental Management : 1 article

Conservation tillage practice in sub-Saharan Africa: The experience of Sasakawa Global 2000

# Crop Protection : 1 article

Determination of relevant sensory properties of pounded yams (*Dioscorea* spp.) using a locally based descriptive analysis methodology



# International Journal of Food Microbiology

- Culture-independent analysis of the microbial composition of the African traditional fermented foods potopoto and dégué by using three different DNA extraction methods
- Effect of boiling and roasting on the fermentation of soybeans into dawadawa (soy-dawadawa)
- Use of traditional African fermented beverages as delivery vehicles for *Bifidobacterium lactis* DSM 10140
- Identification of probiotic microorganisms in South African products using PCR-based DGGE analysis
- Microbiological and chemical changes during the fermentation of African locust bean (*Parkia biglobosa*) to produce afitin, iru and sonru, three traditional condiments produced in Benin

# Anaerobe

- The effect of traditional African food mixtures on growth, pH and extracellular polysaccharide production by mutans streptococci in vitro
- In vitro growth and acid production by mutans streptococci on traditional African foods

## Systematic and Applied Microbiology

- Diversity and technological properties of predominant lactic acid bacteria from fermented cassava used for the preparation of Gari, a traditional African food

# ***Journal of Applied Sciences and Environmental Management***

1. **Indigenous Fruits of Botswana**
2. **Use of Experimental Design for Peuhl Cheese Process Optimization**
3. **Effect of Sprouting on invitro digestibility of some locally consumed leguminous seeds.**
4. **Evaluation of the potential of some local spices as stored grain protectants against the maize weevil *Sitophilus zeamais* Mots (Coleoptera: Curculionidae)**
5. **Study of the hibiscus *esculentus* mucilage coagulation-flocculation activity**
6. **The Effect of Storage on the Nutrient Composition of Some Nigerian Foodstuffs: Banana and Plantain**
7. **Nutritive Composition and Sensory Properties of Ogi Fortified with Okra Seed Meal**
8. **Studies on Some Major and Trace Metals in Smoked and Oven-Dried Fish**
9. **Estimation of Tannin, Saponin, Oxalate, Cyanogenic and Cardiac Glycosides in *Garsinia Kola***
10. **Sensory Evaluation and Proximate Analysis of African Yam Bean (*Sphenostylis stenocarpa* Harms) moimoi**

- 11. Sensory attributes, microbial quality and aroma profiles of off vine ripened mango (*Mangifera indica* L.) fruit**
- 12. An assessment of the microbiological safety of dry yam (gbodo) processed in South West Nigeria**
- 13. The nutritional value of fourteen species of edible insects in southwestern Nigeria**
- 14. A survey of the microflora of *Hibiscus sabdariffa* (Roselle) and the resulting "Zobo" juice**
- 15. Feasibility of cheese production and whey valorization in the Adamawa Province of Cameroon**
- 16. Hygienic status assessment of dish washing waters, utensils, hands and pieces of money from street food processing sites in Ouagadougou (Burkina Faso)**
- 17. Antioxidant properties of *Myristica fragrans* (Houtt) and its effect on selected organs of albino rats**
- 18. Characteristics of fermentation yeast isolated from traditional Ethiopian honey wine, *ogol***
- 19. Methods of preparation and nutritional evaluation of dishes consumed in a malaria endemic zone in Cameroon (Ngali)**

# Journal of Food engineering

1. Survival and preservation after freeze-drying process of thermoresistant acetic acid bacteria isolated from tropical products of Subsaharan Africa
2. Soaking behaviour and milky extraction performance of **tiger nut** (*Cyperus esculentus*) tubers
3. Some aspects of the production of dry **Dackere**, a granular starchy food from corn
4. Effect of soaking, dehulling, cooking and fermentation with *Rhizopus oligosporus* on the oligosaccharides, trypsin inhibitor, phytic acid and tannins of **soybean** (*Glycine max* Merr.), **cowpea** (*Vigna unguiculata* L. Walp) and **groundbean** (*Macrotyloma geocarpa* Harms)
5. Design, construction and testing of a dehuller for African breadfruit (*Treculia africana*) seeds

# Quelques leçons tirées

- Très peu de travaux ont trait à la nutrition humaine
- Peu de publications étudient la relation aliment traditionnel et état nutritionnel
- On parlera souvent de l'état nutritionnel d'un coté et de l'aliment d'un autre côté.
- La synergie entre nutritionnistes et les autres disciplines reste encore faible.
- Lorsque la dimension nutritionnelle est prise en compte, on s'intéresse seulement à la malnutrition et non aux nouvelles maladies émergentes (obésité, MCV, HTA, cholestérol..)

# Aliments de compléments

- Du fait de l'ampleur de la malnutrition, de nombreux chercheurs tournent leurs travaux vers la production d'aliments de compléments composés de mélanges de céréales et légumineuses.
- Mais beaucoup d'études ne prennent pas en compte la problématique de la densité énergétique qui est déterminante dans la production des aliments de compléments. Ceci a été la cause de non succès de nombreux programmes de supplémentation alimentaire.

# Caractérisation physicochimique et organoleptique des aliments

- Des efforts sont observés dans la connaissance de la valeur nutritive des aliments.
- La composition chimique des aliments est étudiée. Mais la teneur en nutriments, particulièrement en micronutriments, ne reflète pas ce qui est absorbé par l'organisme.
- La problématique de la biodisponibilité commence à être abordée. Elle devrait être systématique.
- **Peu d'études prennent en charge l'étude des propriétés fonctionnelles des aliments. Cette dimension est essentielle pour l'avenir !**



# Biotechnologie microbienne

- L'étude des fermentations, lactiques en particulier, est importante à cause de la place des produits fermentés dans l'alimentation africaine.
- Objectif : avoir des fermentations contrôlées grâce à des starters et essais d'optimisation
- Les bactéries lactiques sont essentielles dans la nutrition humaine mais cet aspect est souvent très peu abordé.

# Aliments traditionnels étudiés

- Sorgho/mils                    ++
- Maïs                                +++
- Manioc                            +++++
- Igname                            +++++
- Plantain                          ++
- Légumineuses                  +++
- Légumes feuilles :            ++
- Fruits forestiers :            +
- Insectes :                            -

# Travaux en cours en rapport avec la nutrition

- Index glycémique du fonio et des sorghos
- Propriétés fonctionnelles de Fruits forestiers
- Effets hypocholestérolémiants du Gombo
- Enrichissement des aliments de compléments à base de céréales en bactéries lactiques
- Effets des légumes feuilles sur la prévalence de l'anémie et de la carence en vitamine A

Je vous remercie  
pour votre attention