

## USING BIODIVERSITY FOR FOOD, DIETARY DIVERSITY, BETTER NUTRITION AND HEALTH

E. Frison<sup>1,3</sup>, I.F. Smith<sup>1</sup>, T. Johns<sup>2</sup>, J. Cherfas<sup>1</sup>, P. Eyzaguirre<sup>1</sup>

### Abstract

A significant proportion of the diverse foods available in our environment have been neglected as technological options focus on few staple foods to address global food security and hunger. Despite strides made in reducing hunger, there remains a formidable health challenge posed by obesity, nutrient deficiencies, or dietary lack of non-nutrient health protecting phyto-chemicals found in legumes, fruits and vegetables. Micronutrient deficiencies continue to be addressed largely through single-nutrient based interventions that require significant resource investments. Rapid environmental changes are associated with the worsening global food, nutrition and health situation. Overpopulation, ecosystem destruction and loss of biodiversity, food production strategies that focus on few crops – maize, rice and wheat, resulting in reduced consumption of legumes, fruits and vegetables are all associated with urbanization and changing lifestyles, dietary simplification and its negative health impacts. Emerging research and epidemiological evidence link lack of dietary diversity to the growing incidence of chronic diseases. Increases in non-communicable diseases have been associated with shifts in dietary patterns in urban, peri-urban and rural communities where traditional food systems are breaking down and the shift is towards Western-type cereal-based high energy diets. How can this complex situation be redressed? Food based strategies are key to addressing global hunger and malnutrition, and maintaining biodiversity in the food systems is essential for ensuring food security, adequate nutrition and health. Success of these strategies requires aggressive promotion of indigenous foods whose nutritional and health protecting properties are increasingly being ascertained, and the incorporation of hitherto unemployed traditional and indigenous food systems into nutrition intervention strategies. Such strategies would then be based upon an ecosystem approach that maximises the “fruits” of our environment for food, better nutrition and health.

<sup>1</sup> International Plant Genetic Resources Institute, Via dei Tre Denari 472a, 00057 Maccarese, Rome, Italy

<sup>2</sup> School of Dietetics & Human Nutrition, Macdonald Campus, McGill University, Ste Anne de Bellevue, Quebec, H9X 3V9, Canada

<sup>3</sup> To whom correspondence should be addressed. Email [e.frison@cgiar.org](mailto:e.frison@cgiar.org)  
Phone # 39-06-6118247

## **Introduction**

A significant proportion of the diverse foods available in our environment have been progressively neglected in spite of modern and “improved agricultural practices”, thereby narrowing the base of global food security. This has resulted over the years in food supply crises, hunger and malnutrition. Despite strides made in reducing global hunger through increases in cereal productivity [1], the world is still hungry, and the availability of cheap cereal foods has coincided with the erosion of agricultural biodiversity and a reduction in dietary diversity. Furthermore, strategies adopted to address the ongoing food insecurity, hunger and malnutrition, particularly in developing countries, continue to narrow the food supply base through technological options that neglect indigenous and traditional food systems while focussing on a few staple crops. Increased availability of, and intakes of cereal and cereal products in developing countries have been linked to decreased intakes of iron, and increased incidences of iron deficiency anemia [2]. Enormous resources have been invested globally in the fight against iron and other micronutrient deficiencies, yet, there remain formidable health challenges posed by the continuing high prevalence rates of micronutrient deficiencies [3], increasing rates of obesity and non-communicable diseases linked to a lack of dietary diversity [4,5,6]. These are some of the consequences of the nutrition transition with its attendant simplification of diets.

In the 1991 report [7] of the ACC/SCN's ad Hoc Group on “Policies to Alleviate Underconsumption and Malnutrition in Deprived Areas”, the group noted that the aims of socio-economic development include preventing inadequate nutrition. It went on to say that this objective of preventing inadequate nutrition will not be reached unless actions different or additional to those presently undertaken are pursued. More than ten years later, the world is waking up to the fact that indigenous and traditional food systems of the poor and rural communities need to be mobilized in the search for solutions to the global problems of poverty, hunger and malnutrition. The International Plant Genetic Resources Institute (IPGRI) proposes a strategy that derives from the bio-diverse environment and makes the most of locally available biodiversity. It is a strategy that seeks to re-vitalize and draw on existing indigenous and traditional knowledge and food systems, thereby engendering livelihood options for the poor and malnourished in rural and urban communities in Sub-Saharan Africa in particular, and other developing parts of the world.

## **The Transition to Simplified Diets**

At the close of the 19<sup>th</sup> century, and the first half of the 20<sup>th</sup> century, the food resources of Africa came from cultivated plants, semi-cultivated plants and uncultivated (wild) plants belonging to primary spontaneous flora [8]. The cultivated and semi-cultivated plants constituted the staple crops while uncultivated food crops supplied accessory foods, condiments and drinks. Both wild and cultivated vegetables were major and indispensable ingredients in the accompanying sauces for the carbohydrate staples. There were also wild fruits, some other leaves and tubers that were resorted to in times of food shortages. Indigenous diets were thus diverse. Furthermore, the whole gamut of foods available to the indigenous populations included exotic food crops that were introduced into the continent from about the 8<sup>th</sup> to mid 20<sup>th</sup> century. These introduced crops such as maize, rice, cassava, sweet potato, banana, plantain, were adopted as

they fitted local environments and the diverse African food cultures. There was food abundance, but the colonial economies and post-independence development schemes placed greater importance on the production and consumption of cash crops and introduced foods leading to the displacement of indigenous food crops, and subsequent changes in the complex and diverse food habits of the African peoples.

The 1950s thus witnessed the emergence of cash crop economies in the sub-continent. Communities were encouraged by the colonialists to grow food crops for sale in order to “improve their standards of living” [9]. Forests were cleared to make way for cash crop farming. These clearing and cultivating activities modified the existing ecosystems and eliminated some wild indigenous food trees, and other gathered foods [10]. The trend towards commercial farming also had a negative effect on the cultivation of the less commercial indigenous food crops that hitherto contributed immensely to the food habits and nutrition of local populations. This decline and displacement of indigenous food crops coincided with a period of rising food shortages and increased dependence by local populations on introduced or donated cereal foods. The combination of the decline in the use of indigenous crops and gathered species, and the reliance on food aid grains such as wheat, rice and maize is associated with the simplification of African diets. Thus, the period 1950 to date could well be described as a period of shrinking food supplies in terms of per capita output and the diversity of foods produced in much of Sub-Saharan Africa. The growing emphasis on mono-cropping to ensure high yields of cash crops and staples, discouraged intercropping and brought a further reduction in crop varieties [10], decreases in food choices leading to further dietary simplification.

Other factors that have exacerbated the already food insecure situation and loss of dietary diversity in the sub-continent include high rates of population growth with its attendant ecosystem destruction associated with industrial and commercial development. Reporting on the availability and use of wild food plants in Uganda, Tabuti et al [11] noted that the erosion of the ecosystem diversity has affected the availability of some indigenous food crops. A large number of wild food plants are no longer available for consumption because their habitats have been cleared for large scale agriculture and for settlement. Urbanization and new socioeconomic pressures on both rural and urban families, as well as lifestyle changes among the urban poor, force families to turn to high carbohydrate, high fat street foods in order to meet their daily food needs [12]. With increasing urbanization, the trend in dietary simplification continues. More and more African women find employment outside the home, they have less time available to prepare family meals and so turn to high energy but low nutritional value street foods or easy to cook cereals like rice, wheat and maize.

### **A Necessary Move Back in Time**

Increasing research and epidemiological evidence [4,5,6] link the lack of dietary diversity, particularly of vegetables and fruits, to the growing incidence of chronic and non-communicable diseases in both developed and developing countries. These studies emphasize the critical and beneficial health effects of diets that are rich in vegetables, fruits [4,5] as well as herbs and spices [13]. For the poor and deprived populations in sub-Saharan Africa now subsisting on simplified diets, and who are grappling with problems of micronutrient deficiencies, this is an added health burden. Among African policy makers and development specialists, there seems to be growing awareness that Africa has the wherewithal to begin to tackle her problems of food insecurity, nutrition and health. The key is to build on African resources and solutions.

There is convincing research evidence [14,15] that the bioactive components in fruits and vegetables that produce the widely reported beneficial health effects are phyto-chemicals. Some of the reported biological effects of these phyto-chemicals include antibacterial, antiviral, anti-inflammatory, antithrombotic and vasodilatory actions, as well as pronounced antioxidant and free radical scavenging properties. These reports provide strong and convincing information tools for aggressive public awareness campaigns for dietary diversification and for populations to increase their daily intakes of fruits and vegetables. However, there is a dearth of information on such vital studies in sub-Saharan Africa where nutritional data on indigenous and traditional fruits, vegetables, condiments and spices are few and fragmented. One reason for this is that modern agriculture and nutritional sciences have hitherto not seriously considered the role of indigenous and uncultivated wild plants in the diets of rural and peri-urban populations who have been the targets of nutrition intervention programmes in the past several decades. In a review of the scanty published literature, Grivetti & Ogle [16] reported that uncultivated and wild edible fruits, vegetables and other plants species supplied significant amounts of micronutrients to diets in Gambia, Mali, Niger, Swaziland, Tanzania and Burkina Faso. In a recent publication [17], Oboh & Akindahunsi reported significantly high total phenol content and antioxidant activity in commonly consumed leafy vegetable in Nigeria. However, a large number of indigenous and traditional food plants, particularly non-staples like leafy vegetables, sauce condiments and spices are yet to be correctly identified and analysed for their nutritional and functional properties. These foods that are part of the traditional food systems, though abandoned by some communities [11], are still being gathered and used in other parts of the sub-continent [18,19]. They therefore need to be exploited and effectively utilized in strategies developed to tackle the perennial problems of food insecurity, hunger, malnutrition and disease in sub-Saharan Africa.

### **Redressing the Complex Food, Nutrition and Health Situation in Sub-Saharan Africa (SSA)**

The effectiveness of food based strategies against nutrient deficiencies necessarily requires the availability of and easy access to nutrient rich food crops by populations at risk. More importantly, we need to promote the regular consumption of foods derived from these crops by finding ways to make them available in easier to prepare forms and markets. Implementing food-based strategies in sub-Saharan Africa has met with limited successes [20]. Among the factors that contribute to this is the fact that indigenous and traditional food systems are seldom considered as a basis for nutrition intervention strategy development and implementation. This is not surprising considering the lack of knowledge among programme planners and implementers of the nutritional and functional properties of indigenous and traditional foods that are often more familiar and accessible to the targeted malnourished populations. Thus, success in redressing the food, nutrition and health situation in the sub-continent, hinges upon revitalizing indigenous and traditional food systems, while at the same time promoting the use of biodiversity to ensure food availability and dietary diversity.

The International Plant Genetic Resources Institute (IPGRI), by virtue of its mandate to advance the conservation and sustainable use of plant biodiversity, has taken a lead role in this vital demarche towards expanding the food base for the deprived, hungry and malnourished communities in the developing world. Its programme activities also engender these communities to look inwards to their traditional food systems for ways to

ameliorate their existing problems of hunger, food insecurity, malnutrition and disease. IPGRI's nutrition initiatives in SSA, under its Diversity for Livelihoods Programme, has embarked on the following priority strategies :-

Food consumption surveys in Uganda, Kenya and Tanzania to identify and document what varieties of indigenous/traditional foods are consumed, how frequently, and the importance of these foods in the overall diet plan of families and communities.

Market surveys to identify supply chains, what types of indigenous foods are sold, as well as current trends with respect to production, demand and supply.

Production and use of biodiversity in African leafy vegetables (ALV). The ALV project between IPGRI and its partners in South Africa, Cameroon, Kenya, Senegal and Zambia combines indigenous knowledge and conventional documentation of genetic diversity with nutritional analysis, in order to establish a clear link between agricultural biodiversity and the nutritional well being of the rural poor.

Public awareness campaigns which have started in Nairobi, Kenya with the organization of a traditional foods week, in collaboration with the National Museums of Kenya

The desired outcomes of these and other strategies being developed, include significant improvements in the conservation and use by communities, of agro-biodiversity, improved and nutritionally adequate diets, as well as income generation leading to poverty reduction. It is also envisaged that the public awareness activities will lead to significantly increased awareness by communities of the close links between their environment, nutrition and health. IPGRI is well aware of the limited evidence base in sub-Saharan Africa linking biodiversity, nutrition and health. However, while it calls for more research to substantiate these links, using available information, IPGRI has set itself the goal of deploying agricultural biodiversity to improve food security, ensure better nutrition and health.

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