The Potential of Indigenous Wild Foods

Workshop Proceedings, 22-26 January 2001

April 2001

Funding provided by:
USAID/OFDA
Implementation provided by:
CRS/Southern Sudan
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Contents

Setting the Stage: Southern Sudan Conflict and Transition[1]

During the 45 years since independence Sudan has witnessed relative peace for only 11 years between 1972 and 1983. From 1956 to 1972, southern Sudanese fought for independence from the North in the Anyanya I conflict. From the time this conflict ended with the signing of a peace agreement in Addis Ababa in 1972, the South experienced peace and a certain degree of self-determination in a federated union with the North. However, conflict emerged again in 1983 with the start of the Anyanya II insurrection.

Although the players and dynamics have varied through the different stages of conflict, the themes and matters of dispute have remained relatively constant. The issues have been freedom of religion for the non-Muslim South, imposition of Islamic law in the South and economic underdevelopment and exploitation of the South by the North. Various peace efforts have been undertaken, but none have succeeded, and although it is clear that the war cannot continue indefinitely, there appears to be no end in sight.

What sets Sudan apart from other humanitarian disasters throughout the world is its duration, magnitude, and cost. Since the disaster began 18 years ago in 1983, it has been estimated that more than 2 million Sudanese have died from war-related causes. In addition, over 80 percent of southern Sudan's estimated population of five million has been displaced at some time since 1983. Currently, it is estimated that there are four million internally displaced Sudanese—the largest displaced population in the world.[2] Over the past 10 years, the U.S. Government alone has provided more than $1 billion in humanitarian assistance to Sudan, of which $834 million was provided by USAID.[3] It is estimated that the international community spends $1 million in humanitarian assistance to Sudan each day, while the GOS is estimated to spend approximately the same amount each day to finance its war effort.

These characteristics of the Sudan emergency are what led USAID to adopt a rehabilitation-oriented approach for the zones of stability within southern Sudan. Stability, which has increased over the past five years, has created the necessary conditions for the provision of less traditional food aid and the provision of more assistance aimed at economic recovery. (See Maps 1-3) The USAID approach differs from other donors because of the size of the share of its assistance that has gone toward rehabilitation-oriented activities. Since it first began to fund these types of activities in 1993, USAID has contributed 4.4 percent of its total assistance (more than $24 million) to rehabilitation-oriented activities in the West Bank. This figure includes $3 million in development assistance funds obligated as part of a total of $7 million for the three-year STAR program, which started in 1998.

The indigenous wild food plant study in southern Sudan is one of the projects supported by USAID which is intended to provide better information on the tremendous resource base already existing in southern Sudan and the potential for indigenous wild food plants (IWFPs) to play a vital role in attaining food

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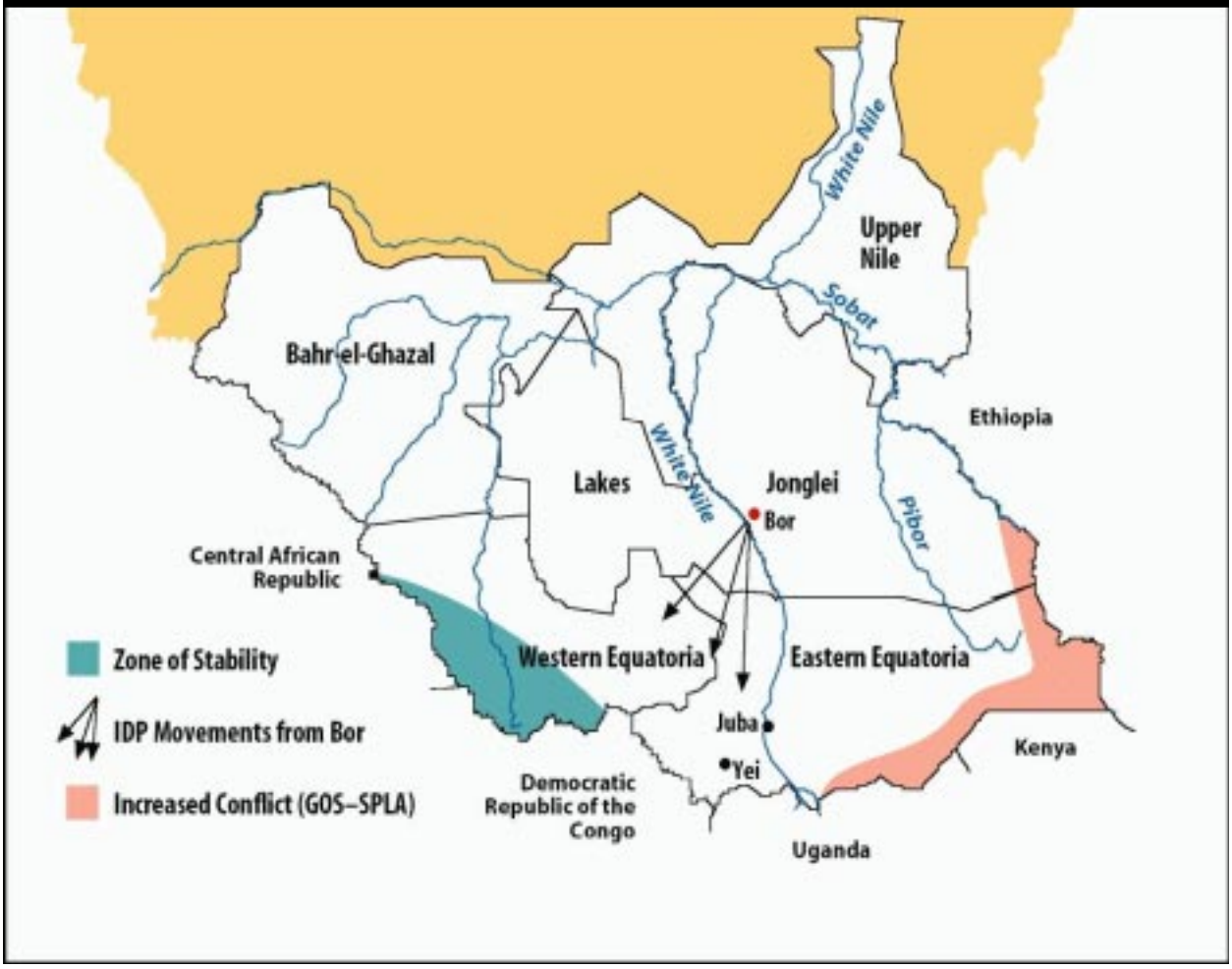
[1] The information in this section was taken from "Evolution of a Transition Strategy and Lessons Learned: USAID Funded Activities in the West Bank of Southern Sudan, 1993 to 1999," by Anne O'Toole Salinas, USAID/Bureau for Africa, and Brian C. D'Silva, USAID/Regional Economic Development Services Office, East and Southern Africa. A copy of this paper can be found at http://www.dec.org/pdf_docs/PNACF763.pdf.

[2] Millard Burr, "Quantifying Genocide in Southern Sudan and the Nuba Mountains,: 1983–1998" (U.S. Committee for Refugees, December 1998).

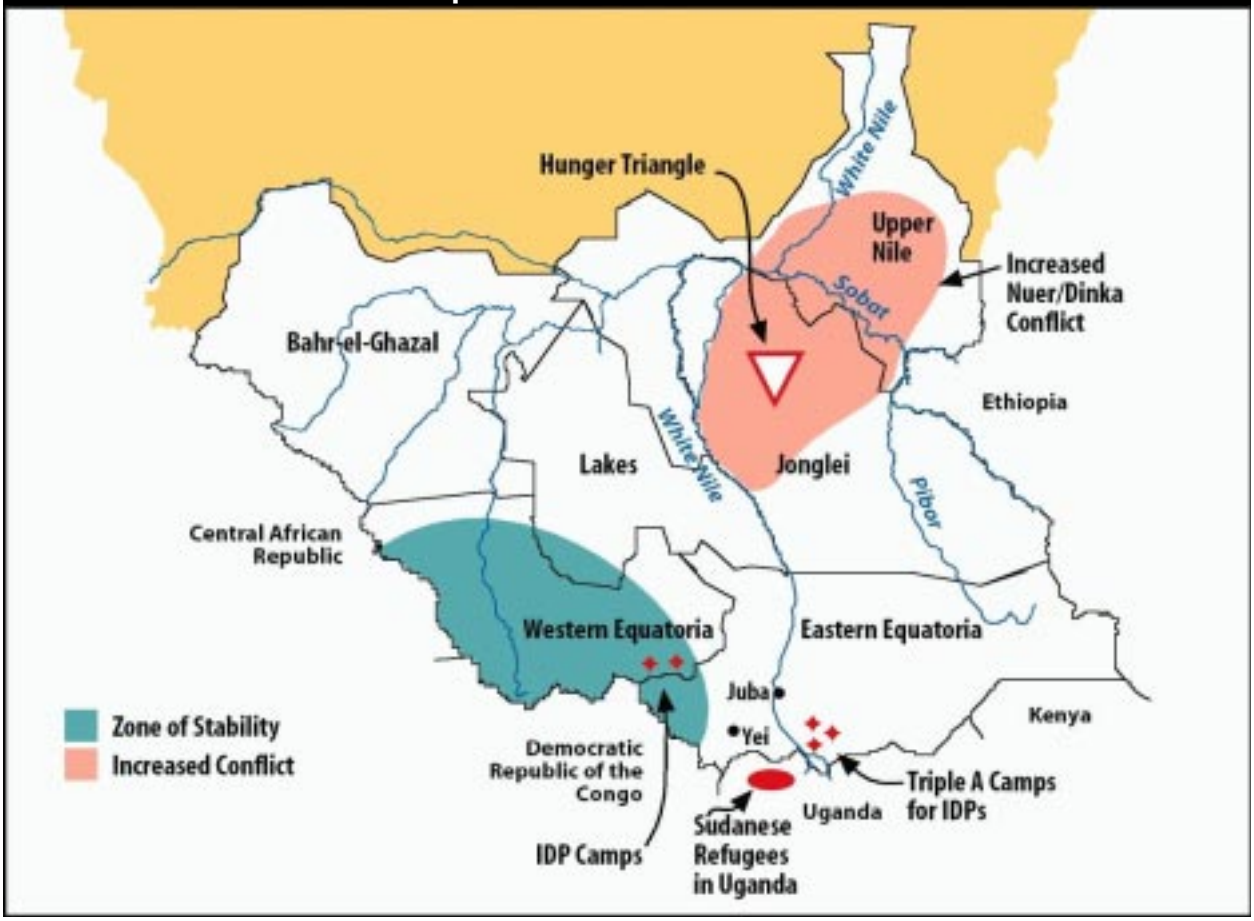
[3] Unclassified State Department Cable 107180, 092046Z (June 9, 1999). "Office of Foreign Disaster Assistance Commodity/Service Report (as of June 22, 1999)". *US Overseas Loans and Grants: Series of Yearly Data*. "BHR/FFP FY98 Support for Programs in Sudan, as of September 30, 1998." "BHR/FFP FY99 Support for Programs in Sudan, June 2, 1999."

security. With more information about what people eat and when, donor agencies will have a better idea of nutrition needs. In southern Sudan, the IWFPs study included field surveys, data collection, and community discussions. The Workshop on the Potential of Indigenous Food Plants, held in Diana, Kenya, 22-26 January 2001, was an effort to extend lessons and information from the Sudan experience and to assess similar work in the region.

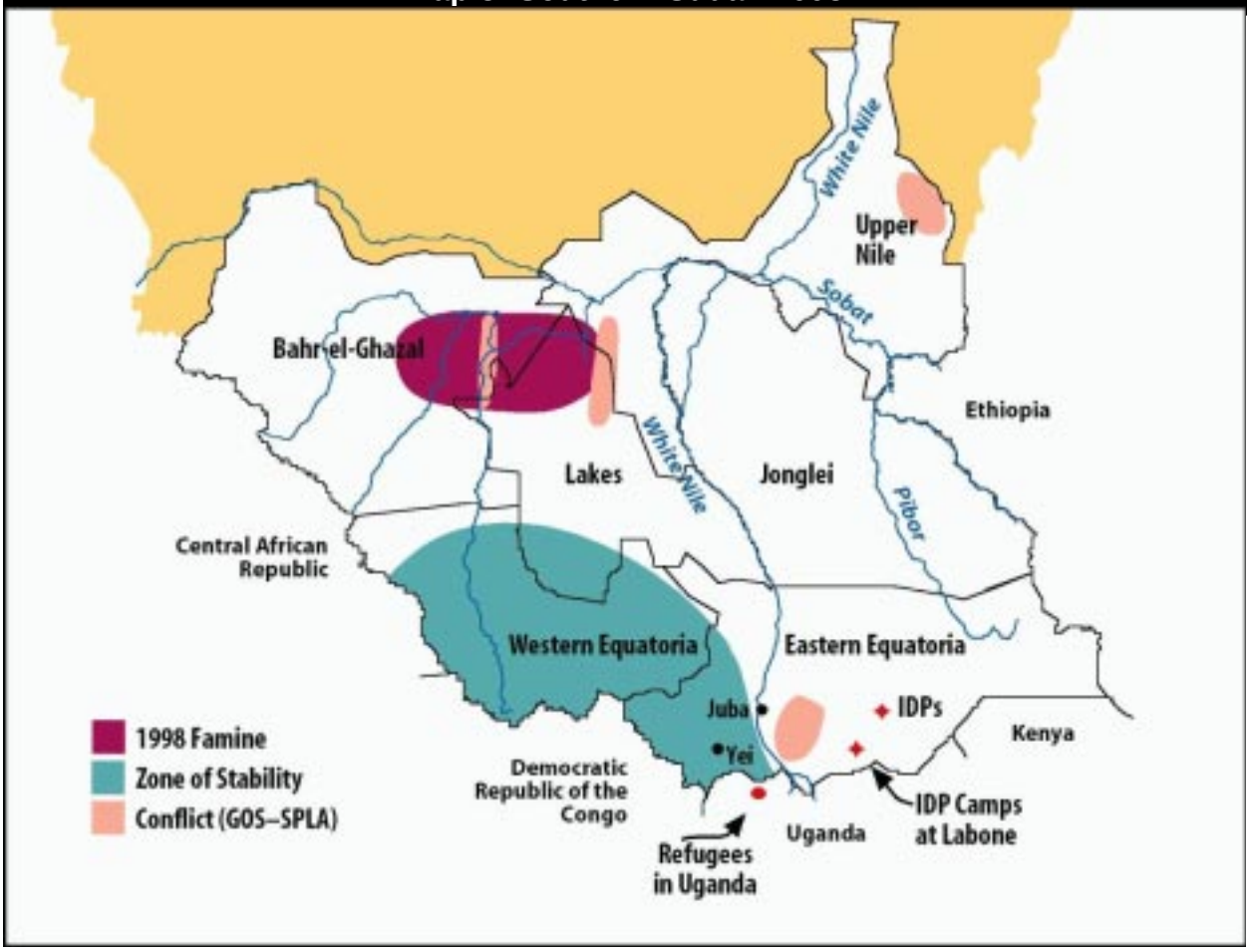
Map 1: Southern Sudan 1992



Map 2: Southern Sudan 1994



Map 3: Southern Sudan 1998



Glossary of Acronyms and Abbreviations

AETFAT	Association for the Taxonomic Study of the Tropical African Flora
ATI	Appropriate Technology International
AVDRC	Asian Vegetable Development Research Centre
CARPE	Central African Regional Program for the Environment
CFCU	Coastal Forest Conservation Unit
CIKSAP	Centre Indigenous Knowledge Systems and Products
CRS	Catholic Relief Services
CRTA	Crop Resources of Tropical Agriculture
CTA	Technical Center for Agricultural and Rural Cooperation
DfID	Department for International Development
DRC	Democratic Republic of Congo
EFC	Ethiopian Food Corporation
FAO	Food and Agriculture Organization of the United Nations
FSAU	Food Security Assessment Unit
ICRAF	International Centre for Research in Agroforestry
ICT	Information and communication technology
IDEAS	Institute for Development, Environmental and Agricultural Studies, south Sudan
IDRC	International Development Research Centre (Canada)
IPGRI	International Plant Genetic Resources Institute
IPR	Intellectual property rights
IRSAT	Insitut de Recherches en Sciences Appliquees et Technologiques, Burkina Faso
ITDG	Intermediate Technology Development Group
IWFP	World Food Programme
KENRICK	Kenya Resource Centre for Indigenous Knowledge
KSE	Kenya Society of Ethnoecology
MINEF	Ministry of Environment and Forests, Cameroon
NAPRECA	Network on Natural Product Research for East and Central Africa
NARO	National Agricultural Research Organization, Uganda
NGO	Non-governmental organization

NMK	National Museums of Kenya
NTFP	Non-timber forest products
PROTA	Plant Resources of Tropical Africa
PTD	Peace Through Development
REDSO	Regional Economic Development Support Office
RELMA	Regional Land Management Unit
Sida	Swedish International Development Cooperation Agency
SNNPR	Southern Nations, Nationalities & People's Region
SRRA	Sudan Relief and Rehabilitation Association
SSI	Semi-structured interviews
UGANEB	Uganda Group of the African Network of Ethnobotany/Ethnoecology
UN-EUE	United Nations Emergencies Unit for Ethiopia
USAID	United States Agency for International Development
VSO	Voluntary Service Overseas

Session 1: January 23

Chair: Brian D'Silva, USAID

Official Welcome

Dirk Dijkerman, USAID/REDSO

Mr. Dijkerman officially opened the workshop and expressed his appreciation of the importance of indigenous wild foods in the region. Fora such as these provide us with a good touchstone for what is happening in the field. It is important that we take advantage of the opportunity provided by this workshop. Too often this area has been ignored, and often does not get as much attention as other food resources in the region. In many ways the results of research on indigenous wild foods may be fundamentally more valuable in the long term. We need to work with communities to build on the existing knowledge on indigenous foods, and play an educational role, helping to disseminate that knowledge more widely. This workshop also provides us with the opportunity to show what can be done using foreign assistance for people in Africa, and hopefully assist us to increase the resources available for this work. The methodological approaches used are highly participatory and by taking our results back to the communities and countries within which we are working bring in a more iterative approach to the whole research process.

Overview of the Workshop

Brian D'Silva, USAID

The objectives of the workshop:

1. To share the experience of the Sudan process with people in the region.
2. To learn and listen to what other people are doing in the region in the area of indigenous wild foods.
3. To identify where should this work lead us, not in terms of networks or large programs, but what potentials there are for filling the gaps in our knowledge.

In the context of the work in Sudan the process through which the research was conducted is extremely important. It stated with individuals working in different areas, but it became apparent that there was a lot of information and knowledge that we needed to systematize and make more widely available. From this grew the concept of a database covering the indigenous wild food plants of south Sudan. The most important thing is that Sudanese participation was not neglected and was present throughout. The results of the June 1999 Lockichoggio workshop and information collected were taken back to the people and communities in Sudan who provided feedback and comments on the data collected.

Potential of Indigenous Food Plants to Support and Strengthen Livelihoods in Southern Sudan

Birgitta Grosskinsky, Catholic Relief Services/Sudan and Caroline Gullick, University College London

The two researchers have been addressing the issue of indigenous wild food plants using a food economy approach since 1994. The research process has been undertaken in two phases — first, a phase of project design, data collection and research and second a phase of dissemination and implementation. One product of the work on IWFPs (indigenous wild food plants) has been the development of a database of the information collected on the resources of south Sudan.

The rationale behind the research project was that while food relief was being provided to the people in south Sudan, there was little understanding of the foods that people were eating and the nutritional value of their diet. The process began with assessments across Sudan and combined these data with that collected and analyzed in other African countries. The aim was to collect baseline information, to make this information available to other organizations and communities to use in programme planning and implementation, and to understand the importance of IWFPs in food and livelihood security.

Using a participatory approach, the researchers collected data through interviews (in different locations, across seasons, across socioeconomic and ethnic groups, from both men and women). Participatory mapping was undertaken and seasonal calendars of collection and use determined. The data were collected by both the researchers and the south Sudanese people themselves. Specimens, drawing and photographs were taken of IWFPs and nutritional analyses of the foods as eaten were conducted. This was complimented by a literature search on the issue of IWFPs across Africa.

The main constraints to data collection were the large number of languages in the region; the stigma attached to use of IWFPs (and the reluctance to recognize their importance); bias (the preference for organizations to focus on livestock and other traditional sectors); logistic difficulties in the field; the short window of opportunity available for the collection of specimens and the difficulties of storing these correctly; and the lack of processing facilities for photographic film in south Sudan, which meant that it was difficult to ensure that specimens had been captured.

The main findings of the research were that:

1. IWFPS are primarily accepted by communities through custom, habit, and tradition as sources of food.
2. There are a large variety of different types of foods, which help to diversity the diet.
3. Many IWFPs are nutritionally equivalent, and in come cases superior, to introduced varieties (in terms of calories, fats, iron and calcium).

IWFPs are used commonly to improve the taste and texture of other foods. It has further been shown that they can help with the metabolism of other foods, e.g., tamarind can be added to porridge to make it more easily digestible.

IWFPs are crucial to people's survival during times of crop shortage. They are mainly collected by women and children and are used to protect family assets. They have particular economic importance to women, children and the poor. Some of the plants are being cultivated or semi-managed (protection and encouragement of naturally occurring growth and regrowth). In contrast to exotic food crops, IWFPs are adapted to their environment and do not require inputs to the same extent.

Table 1: Illustrative Examples of the Nutritional Content of Introduced and Indigenous Foods

Calories per 100 g				
Cultivated	**Kcal**	**"Wild"**	**Kcal**	**Part**
sorghum	353	Mixed wild grains	380	grain
ground nuts	567	*Sclerocarya birrea*	669	nut
		Nymphea sp.	389	seed
Fat per 100g				
Cultivated	**g**	**"Wild"**	**g**	**Part**
ground nuts	49	*Sclerocarya birrea*	57	nut
		Balanites aegyptiaca	47	nut
		Butyrospernum par.	49	nut
Protein per 100g				
Cultivated	**g**	**"Wild"**	**g**	**Part**
ground nuts	25.8	*Sclerocarya birrea*	28.3	nut
cabbage	2.09	*Amaranthus* sp.	4.8	leaf
		Gynandropsis gynandra	5.8	leaf
Iron per 100g				
Cultivated	**g**	**"Wild"**	**g**	**Part**
cabbage	1.3	*Gynandropsis gynandra*	10.8	leaf
orka	1	*Corchorus* sp.	7.8	leaf
pumpkin	0.8	*Amaranthus* sp.	8.8	leaf
		Leptadenia sp.	13	leaf
Calcium per 100g				
Cultivated	**mg**	**"Wild"**	**mg**	**Part**
mango	10	*Sclerocarya birrea*	20	fruit
pawpaw	24	*Butyrospernum* par.	20-50	fruit
ground nut	92	*Sclerocarya birrea*	120-200	nut

The second phase of the project involves implementation and dissemination. After compilation of the data from a range of different sources the project aimed:

1. To make the knowledge and findings freely available;
2. To raise awareness of the potential of IWFPs;
3. To integrate and mainstream the information into different programmes; and
4. To hold discussions with stakeholders, communities and agencies working in southern Sudan to apply the findings.

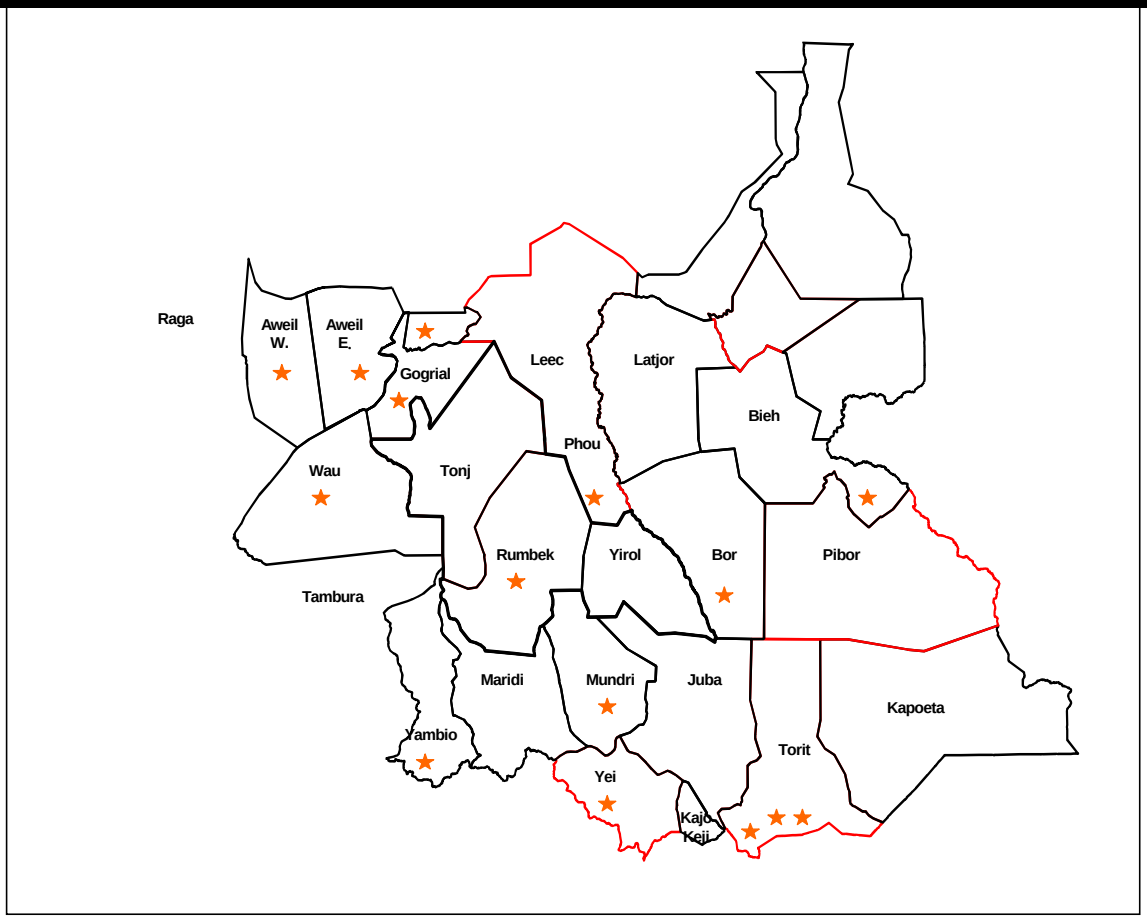
This involved a set of activities that included:

- Disseminating the findings of the study and raising awareness of the potential of IWFPs at different levels (household to policymakers)
- Promoting dialogue within the communities
- Developing a IWFP database for south Sudan

In June 1999 there was an initial workshop for policy and decision-makers held in Lokichoggio, Kenya. The aim of this was to share knowledge on the use and potential of IWFPs and to develop recommendations on the future directions of the project. One major recommendation was that the project should give feedback to the communities where the work had been done.

Acting on this recommendation, 15 workshops were held in the areas where the main body of research had been done (see Map 1), in total 1,500 people attended. The objectives were to share and discuss the findings; to create awareness of the diversity of IWFPs; to link vernacular information with the scientific information; and to encourage discussion on the

Map 1: Community Workshops in Southern Sudan



management and the utilization of the indigenous resources. The participants represented different areas, sectors and agencies in South Sudan.

Selected recommendations from these community workshops were:

1. Disseminate the knowledge and create awareness,
2. Review local policies on the utilization and management of indigenous resources,
3. Further research,
4. Improve appropriate processing methods,
5. Provide training in appropriate processing methods (including exchange of knowledge across south Sudan),
6. Encourage domestication of indigenous food plants (propagation methods not known), and
7. Promote trade of IWFPs.

Constraints to the use and development of IWFPs were identified as:

1. People are not aware of the potential
2. Stigmas and traditional beliefs
3. Loss of knowledge
4. Insecurity limits access in some cases
5. Displacement
6. Marginalized because of preference for organizations to apply external solutions

The data collected is now being put into a database for IWFPs in south Sudan, it includes:

- Names, descriptions and distribution
- Food and other uses

- Nutritional information
- Harvesting and consumption calendars
- Social context
- References

DISCUSSION/COMMENTS FROM THE FLOOR

1. The research process grew out of demand on the ground — different solutions to the problems of food and germplasm supply. The researchers always worked with the communities and people of south Sudan during the planning process, research and data collection. They also attempted to integrate the communities in the dissemination and feedback process. There was significant interaction during the field workshops, which involved people across sectors, wealth groups, gender. Communities took control of the workshops and interactions between ethnic groups, wealth groups and men and women brought up issues of knowledge sharing and the recognitions of the value of different group's knowledge

2. Terminology is important, in some cases what we refer to as indigenous plants may have actually originated in other areas of Africa. What is important is that these plants are present in the landscape, and even if they have undergone some level of domestication or are under management they are covered by the project.

3. Detailed nutritional information is available from a number of resources. Although there are still a large number of IWFPs that have never been analyzed some information can be found in readily available nutritional manuals, including "Nutrition for Developing Countries," Savage King and Burgess (1992).

4. The current situation in south Sudan means that there are a large number of displaced people. There are some positive interactions between the local and displaced populations in particular areas and knowledge on IWFPs is exchanged. However, in a number of areas, knowledge is not really shared, often due to stigma but also because displaced people are seen as temporary resident who would not manage the resource sustainably and there is sometimes conflict between the communities. In some cases seeds are taken by individuals from their homes when they are displaced, however these are mostly not IWFPs but the traditional exotic staple foods.

5. It is often seen that as the market develops for indigenous food plants, gender conflicts can develop as men move into trading areas that had been the prerogative of women and children. Land ownership of south Sudan is not a major issue in IWFPs, as they are almost wholly planted around the house garden. However, as commercialization of products is encouraged (e.g., processing of shea nuts), activities led by women have been taken over by more dominant members of the community.

6. Although this study did not focus on the interaction between supply of relief food and the use of IWFPs, there was a subjective impression that agriculturalists use less IWFPs than other groups. It was also mentioned by communities that the local processing of lulu oil (shea nuts) has been hampered by the sale of 'relief' oil, which is said to decreases the prices of the oil in the market. There is definitely an interaction between relief and IWFPs, however it is not a simple trade off. Although people may rely on relief foods for calories when it is available, they often rely on IWFPs for flavour, texture and strongly preferred foods. Usage of IWFPs is also different across gender, wealth group, age and areas.

Food Security and The Role of Indigenous Wild Food Plants in South Sudan

Mary Abiong Nyok, World Food Programme,
Christine Foustino, Yambio County Development Committee,
Luka Biong Deng, Sudan Relief and Rehabilitation Association,
Jaden Tongun Emilio, Secretariat of Agriculture and Animal Resources

At present it is thought that use of IWFPs is well below that of the past. After the 1965–72 war, a lot of indigenous knowledge was lost and there was a reluctance to use IWFPs, as they were considered not the food of educated people. Since 1972, there has been a long period of struggle, especially for the women of the area. People have survived, using IWFPs as both food and medicine. Throughout south Sudan IWFPs are primarily collected by women.

The community workshops held by CRS/Sudan, WFP and USAID have helped to bring back IWFP knowledge to the people in south Sudan. In the workshop, the possibilities for marketing and exporting IWFPs and IWFP products were noted and it is hoped that palm oil and lulu oil (amongst others) can be developed as export commodities. The most important thing at present is how to develop policies and action plans to implement the processing and marketing of IWFPs

IWFPs ('liim' in Monjeng) are seen in south Sudan as something you can get free from the environment. The community perception of IWFPs is that they are there to help people through the 'hunger gap', and there is little appreciation of the full value of these foods in terms of nutrition.

There are still a number of questions that are being raised in south Sudan relating to the use and development of IWFPs.

1. What are the next steps for the development of processing technologies to help market and export IWFP oil products?
2. What are next steps in the processing of IWFPs that have been identified as nutritional and palatable drinks?
3. What policies are needed to ensure that the benefits of increasing markets (especially for lulu and ambiro) are equitably shared?
4. What should be done to build on the benefits of medicinal IWFPs (e.g. lang, thou, kei, ruuk, cum, apoor, ajuet, cuei , gor, tuuk)?

THE ROLE OF IWFPS IN FOOD SECURITY IN THE NEW SUDAN

The Peace Through Development (PTD), Track III of the blue print developed by the SPLM set priorities in the agricultural sector as follows:

1. The development of food crops, livestock and fisheries for provision of food needs for the people of the New Sudan
2. The development of food crops, livestock and fisheries for cash within and without the New Sudan
3. The development and promotion of cash crops for internal and external markets

The use of IWFPs as food and medicine forms an important part of the livelihood of the communities in the New Sudan. Also the frequent and recurrent famines in the New Sudan due to floods, drought, insecurity and displacements warrants an assessment and study of the role and contribution of IWFPs in the daily diets of the communities.

Policy objective of promotion and utilization of IWFPs

To promote active collaboration / participation of the local communities in promotion and utilization of IWFPs in order to improve their livelihoods, reduced dependency on relief food and ensure food self-sufficiency and sustainable management of these natural resources.

The strategies for the implementation of the policy will include:

1. Ensure development of the local capacity and attitude shifts in favor of IWFPs,
2. Support the development of community institutions to ensure that these resources are protected from illegal harvesting, pests, diseases and fires,
3. Ensure an adequate legal basis of ownership of the resources and other rights to the local communities with corresponding responsibilities,
4. Develop appropriate techniques for processing and storage of IWFPs,
5. Ensure employment opportunities and access to processing and marketing opportunities for different social groups, especially women and the poor or vulnerable,
6. Promote value addition through secondary or tertiary processing,
7. Develop training programmes, field manuals and integrate IWFPs information into schools curricula, and
8. Support domestication of IWFPs with high potential.

Result areas

1. Promote food security
2. Change attitudes towards IWFPs
3. Ensure the donors, NGOs and the communities recognize the role of the IWFPs to increase protection of the environment
4. Collect the existing information
5. Recognize what exists to better develop food security
6. Develop self-dependency and coping strategies during times of disasters

Constraints/Challenges

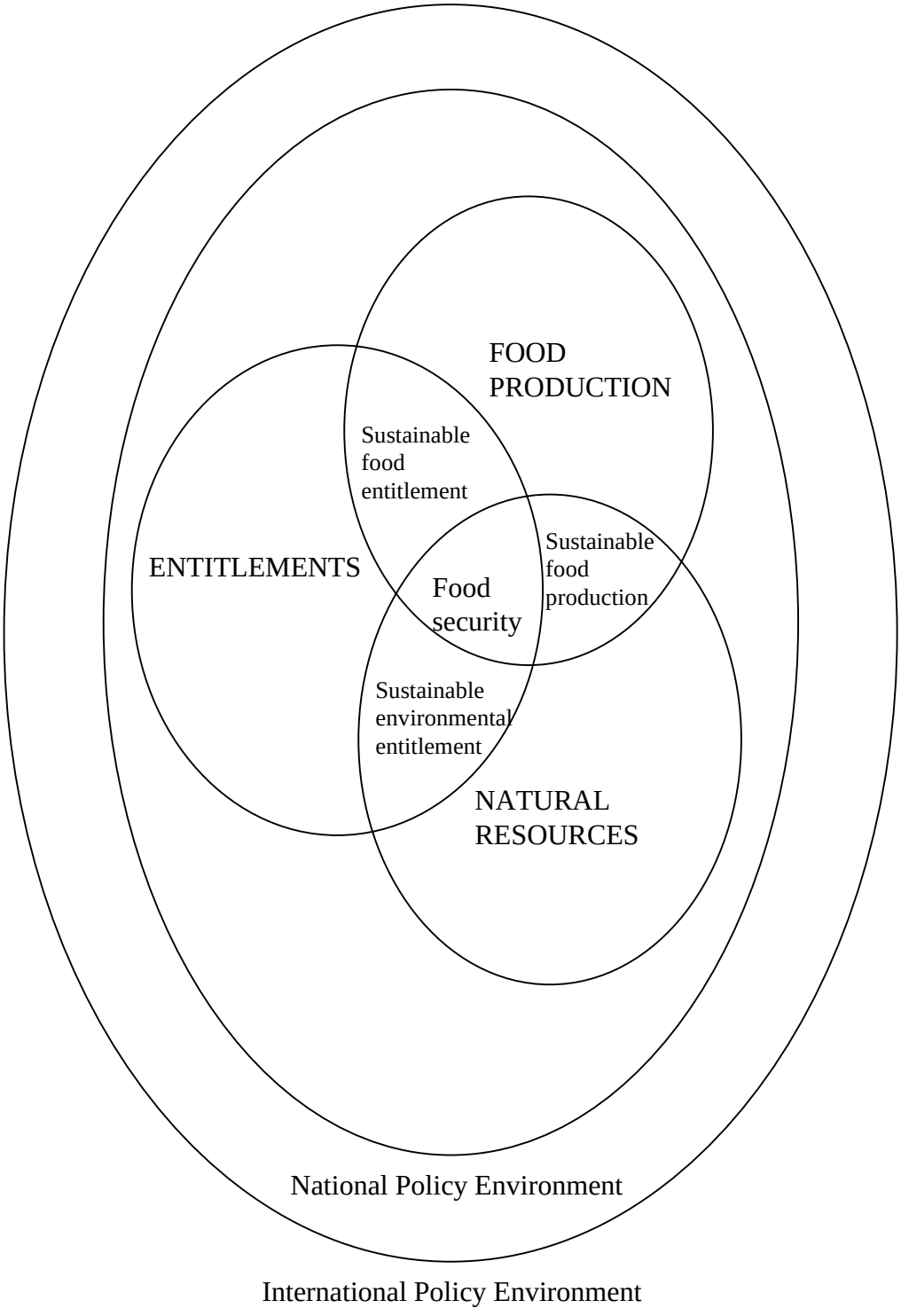
1. Insecurity
2. Lack of awareness of the nutritional value of IWFPs
3. Poor management of the ecosystem
4. Negative perception about IWFPs prevent members of households consuming these foods
5. Availability of IWFPs
6. Certain IWFPs risk extinction because laws do not exist to protect them
7. Research is connected to hunger foods
8. There is a risk that the research remains academic
9. Labor intensive preparation methods and lack of knowledge and toxicity
10. Domesticated foods are more popular than IWFPs
11. Displaced people do not value the resources in the areas where they are taking refuge
12. Collection of IWFPs can be dangerous because of wild animals

WILD FOODS AS A RESOURCE AND INDICATOR OF FOOD SECURITY

In Bahr el Ghazal different counties had different levels of mortality during the 1998 famine. This appeared to be related to the level of knowledge of indigenous food plants. Those communities dependent on livestock experienced high levels of mortality, as did those who had to move from more urban areas to the rural areas.

In south Sudan IWFPs are now being used as part of the early warning systems for monitoring livelihoods — data including the level of collection, who is collecting, and when they are collecting, all give indications of the level of risk. This tends to be a very strong tool for predictions of food security.

Food Security Framework



CONFLICT AND FOOD PRODUCTION IN AFRICA

- Cost in lives, livelihood and military spending
- Declining development assistance
- Food production forgone (average/growth)

DISCUSSION/COMMENTS FROM THE FLOOR

1. Despite the importance of IWFPs and the policy/strategy design, unless land tenure is part of this process there is a serious danger of exploitation of the more vulnerable. Property rights and the institutional framework is a crucial part of the process so that customary and de facto laws can be determined and included in the planned Agricultural and Natural Resource Management policy development.

2. The monitoring system of food security using IWFPs as an indicator has been in effect since 1997. The report generated from the 1997 data predicted the 1998 famine. The monitoring system has been active in 17 counties and is increasing to 21 counties, covering most of the New Sudan. There were some problems with credibility with the international organizations and agencies, however they have now acknowledged the usefulness and relevance of this data. Monitoring is conducted within the communities and therefore has low operational costs. The database developed on IWFPs will become an important part of this programme and will be fed information from the programme. There is strong potential for this system to be adapted for other countries/areas in the region (e.g. Northern Kenya and the IGAD countries).

Session 2

Chair: Brian D'Silva

The Wild Foods Database for South Sudan

Birgitta Grosskinsky and Caroline Gullick

The new wild foods database is an upgrade of previous versions of the database. The main information page gives an introduction, acknowledgements, terms and definitions, methodology, bibliography, and a guide on how to use the database itself. It is possible to enter the database and make comments. Names are selected from a drop down menu, or searched for by type of plant, vernacular name, sites, description, medicinal use, ethno-veterinary use or by other uses. A wide range of data are available for the species in the database, including distribution, calendars (when harvested, when consumed), who harvests, who consumes, what type of food type, preparation methods, storage methods, cultivation techniques, nutritional summaries, and photographs. Reports can be generated by queries — area, vernacular language, species, foods used in a certain time period in a particular area, types of IWFPs used in a certain month, different processing techniques, etc.

The database structure is now finalized and there will be a period of data entry for approximately four months. It is hoped that the database will become available on the Web, CD-ROM and in hard copy by the end of May 2001.

DISCUSSION/COMMENTS FROM THE FLOOR

1. The development of this database brings up a number of issues related to intellectual property rights (IPR). Although it is planned that the database will be launched on the Internet, access to information and communication technology (ICT) is not possible across most of south Sudan. While the local communities that contributed their knowledge to the database are explicitly acknowledged in it along with their rights to ownership of the data contained in it, the researchers are also ensuring that hard copies of the data and CD-ROMs will be distributed to the communities of south Sudan. The web launch is just one step in the sharing of this information and is not the only means of dissemination. The database will be maintained and updated as more information from the field and nutritional analyses become available. By giving wide access to this database it is hoped that agencies will be able to better plan their activities and give a wider context for food security interventions. There are still issues related to placing indigenous knowledge in an easily accessible format. While the capacity to manage IPR issues is still underdeveloped in southern Sudan and parallel to the dissemination of the IWFP work there will be activities to ensure that the people's property rights are not violated.

2. It was noted that Crop Resources of Tropical Agriculture (CRTA) have started a 15-year project to produce a 16 volume series of the crop resources of Africa. This will include all the indigenous food plants that are known. The volume on the vegetable resources is in progress and any researchers, scientists or communities who fell that they would be able to contribute to this are invited to contact Dr. Rudy Schippers (see details in participants list).

3. The database fits in with food distribution systems — looking at the foods people are eating in different areas and how these foods are accessed. To do this you need to know what foods they are eating and how much of each. If food access is restricted by any means then the deficit needs to be compensated by some other food type or by relief. By working with the IWFP monitoring of

the Sudan Relief and Rehabilitation Association (SRRA), then the WFP approach can work very well. The baselines for IWFP intake monitoring began in 1994, and by 1997/8 the process had become more refined. There is a lot of data that now needs to be analyzed and disaggregated to provide information for other sectors. The Food Self Sufficiency cut off point — which is the amount of cereals that people need given that they have access to other foods — now incorporates the use of IWFPs.

Food Source Diversification: Potential to Ameliorate the Chronic Food Insecurity in Ethiopia

Getachew Olana, Consultant

ABSTRACT

As some chronic and transitory factors that are principally related to poor performance of the climate, natural resource base degradation, institutions and policies have been considered as the root causes of the perpetual food insecurity status that prevails in Ethiopia, solutions that address these factors have been frequently proposed and considered. Even though these factors are well acknowledged, the very fact that most of the important, normal and cheap foods that the rest of the world consumes are taboo, discouraged or not available in this country has not been reported. Consequently, no effort has been made with this regard. On the other hand, Ethiopia is endowed with availability of and natural potential for numerous plant and animal food sources that are potentially edible.

In response to the more frequent food shortage in Ethiopia, some worst coping mechanisms that have negative consequences for future environmental development and socioeconomic wellbeing and stability are pursued. Though they are practiced to lesser extent in some areas and in spite of their immense potential, diversification of the usual food sources have not been encouraged and promoted. This country is a land of numerous nations, nationalities and groups that have their own food materials food habits, cultures and values. Since these heritages, especially those which are practiced by 'minorities,' have been discouraged and over time forgotten or ignored. Consumption of some foods that are efficient and popular for the rest of world are taboo in Ethiopia. On the other hand, some of these consumables are among factors that cause food insecurity of this country. Therefore, it is reasonable to say that Ethiopians are food insecure in the middle of plenty.

This conceptual paper argues that some factors, which include religious, cultural, institutional, socioeconomic and political arrangements, personal behaviors, policy ignorance, are factors that are behind this frequent food shortage. The paper was incepted to provoke discussion on this issue among the people and to bring this issue to the attention of the government and other agencies. After forwarding some conceptual frameworks that are thinly evidenced by findings of a couple of studies, this paper forwards some recommendations for consideration by the public, government and other agencies. Diversifying food sources in Ethiopia could be one way of reducing food insecurity. Strategies include diversification of contemporary food materials and domestication, introduction and adoption of potentially available ones, sensitization and encouragement of the public, pertinent research, development, promotional policy, institutional and advocacy work.

INTRODUCTION

Socioeconomic development indicators available for Ethiopia, a country that leads one of the poorest economies in the world, are unfavorably lower than the average of sub-Saharan Africa. Each year, on the average, about five million people have problems securing enough food for themselves and need assistance[1].

Cereals supply 85% of the total calorie intake in Ethiopia (EFC, 1991). However, as population has grown from 15 million in 1951 to 63.49 million today, the per capita production of cereals has dropped by more than 35% — from more than 200 kg in the early 1950s (FDRE,

[1] 10.6 million for year 2000.

1996) to less than 130 kg by 1997 (table 1). Food aid delivered to Ethiopia (including local purchases) amounted to about 11.1% of the food grain locally produced. Factors that are often mentioned as the principal causes of inadequate growth in food production and increasing food insecurity are: inadequate and variable rainfall, soil degradation, conflict, transport infrastructure, land tenure, storage, poor nutrition and health and heavy workloads on women. Though it is an important problem, the limited and selective food sources used by the people, together with absence of effort to diversify, has not been mentioned.

This conceptual paper is triggered, to provoke discussion on this issue among the scholars and the public at large and to attract the attention of policymakers, implementers and non-governmental organizations and other agencies. This paper could also indicate areas of future research and could contribute to the wealth of information existing on the subject matter. In the next section, the paper provides some background information, while the third part raises some points related to the food security status and discusses strategies employed to cope with it. The ensuing parts provide a comparison of food sources and food habits of Ethiopia and the rest of the world. Also, factors that have caused the highly selective food habits are discussed. Finally, some concluding remarks are forwarded for consideration.

BACKGROUND

In Ethiopia, agriculture, characterized by low performance, is the main source of livelihood, especially for the rural people who constitute more than 85% of the population. Agricultural production grew by 3.8% per annum during the period 1990/91 to 1997/98. However, this level is still inadequate when compared to the 3% annual population growth in the country. Moreover, agricultural production has continued to fluctuate with the rainfall patterns; growth rates are believed to have declined further in 1998/99 and 1999/2000 (Tekie 1999, Mulat, 2000). The scope for increasing food production through expanding cropland has become drastically narrowed. In most parts of the country, horizontal expansion of local food production to keep pace with population growth is becoming increasingly difficult.

So far, no convincing evidence indicates the prospect for a decline in the rate of population growth. This has resulted in an average population density of around 60 people per square kilometer. This growing population has made it impossible to continue traditional methods to maintain soil fertility (fallow periods) and has resulted in soil degradation. These situations underline the need for employing means to increase land and labor productivity. An important question, however, is the possibility and effectiveness of the usually recommended means, technological and biological changes, in Ethiopian agriculture.

The Government of the Federal Democratic Republic of Ethiopia designed a food security strategy in 1996 to ameliorate this chronic problem. The strategy is based on two principles: food security should be sought within the context of comparative advantage in international trade of food crops and food security assistance should continue so as to enable the transition to self-reliance. The strategy addresses both the supply and the demand sides of the food equation, which is interpreted as availability and entitlement, respectively. It has three components: to enhance economic growth and employment, to create additional entitlement/access and targeting programs (like supplementary employment/income generating schemes, programs targeted for very poor and vulnerable groups, and nutrition and health interventions), and to maintain and strengthen emergency capabilities (FDRE, 1996). However, the strategy does not seem to have exhaustively addressed the causes and possible solutions of the case at hand.

An official target was also set for substantially narrowing the “food gap” existing in the country within five years. To this end, in 1994/95, an accelerated agricultural development program was initiated. However, this ambitious program has not been in a position to resolve the problem of food insecurity currently facing many in the country. Nor does the medium-term prospect of a surge in food production imply

the establishment of sustainable agricultural growth for the decades a head. Such a long-term sustainability entails deeper technological progress than possible at present, as well as a reversal of the population pressure on agricultural land (FDRE, 1996). Besides, as stated by Guinand, et al. (2000), it has not been planned to study the potentials and possible contributions of food materials that are potentially edible, but usually referred as 'wild foods' or 'famine foods'. It has also not been planned to promote consumption of these food materials and to study and introduce new food materials.

In 1998, based on the food security strategy, the government issued a food security program for 1998–2002. The overall objective of the program was to ensure access to food for the most vulnerable people in selected areas of the country and, at the end of the program period, it is expected that the current size of vulnerable population in the target area will be food secured. The program, designed to address all food insecure social groups living in selected target areas, has the following components: agriculture (crop and livestock), small scale irrigation, infrastructure/rural roads, sustainable use of natural resources base, market and credit services, clean water supply and capacity building (FDRE, 1998). Similar to the strategy, the program has also not included some complementary possibilities like diversification of food sources and promotion and popularization of the food materials that are used during food shortage periods and the other potentially usable ones.

A National Disaster Prevention and Management Policy has been issued so that relief assistance is provided to the affected population in a manner which ensures that such efforts contribute towards disaster prevention and sustainable growth and development. The Policy was also designed to ensure that disaster prevention activities get due attention in the government's development effort. The policy aims at a congruence of relief effort and planned development to strengthen the economic fabric of the disaster-prone areas so as to mitigate the suffering of the affected population and enhance their capability to face the challenge of such disasters in the future. The policy in general has failed to appreciate and further promote some of the traditional and local coping mechanisms of the people such as limited food source diversification. With this regard, historical facts of the country like domestication of *teff* and *enset* could also have been appreciated.

In spite of the chronic as well as transitional food insecurity broadly confronting the people and the government, and prevalence of multitude of problems that hinder its future improvement, in Ethiopia, a highly selective and restricted food consumption habit is practiced. Besides, not to contribute to bridging of the chronic food gap of the country, important foods of the world are not consumed in Ethiopia due to reasons that are not exhaustively investigated so far. Further, no visible effort has been made to introduce, domesticate or study new food materials. These are among the important factors that threat the food security status of the people and the country at large. In spite of this fact, the case has been overlooked or has not been addressed by the policy makers, governmental and non-governmental development workers and the scholars.

FOOD INSECURITY AND COPPING MECHANISMS IN THE COUNTRY

Food Security Status

According to Human Development report of the World Bank for 1995, Ethiopia is ranked 171 out of 174 poor countries. Similarly, according to the World Bank (1998) report, with a GDP per capita of only US $110 in 1997, Ethiopia has one of the poorest economies in the world. EC/CTA (1997) puts Ethiopia as a first priority in the group of low income, highly food aid dependent and least advanced countries with a high food insecurity index. The average calorie intake in the country is only 73% of the required amount, which is low – even for Africa. All available sectoral development indicators show that Ethiopia is faring far even below the average level for sub-Saharan Africa.

Although Ethiopia is clearly not unique in its experience of famine, its continued status as one of the most famine-prone countries in the Horn of Africa, coupled with its recent history of drought, war, and political

Table 1. Proportion of Drought Affected Population, Food Grain Production, and Food Aid

Year	Population (millions)			Food aid		Food grain production	
	Total	Disaster/ drought affected	Proportion affected (%)	Total ('000 MT)	Proportion of production (%)	Total ('000 MT)	Per capita (kg)
1981	31.90	2.82	8.84			6,212	195
1982	32.77	3.70	11.29			7,683	234
1983	41.03	3.30	8.04			6,603	161
1984	42.18	4.21	9.98			4,386	104
1985	43.35	6.99	16.12	1,272	26.20	4,855	112
1986	44.65	6.14	13.75	926	17.13	5,404	121
1987	46.17	2.53	5.48	277	4.14	6,684	144
1988	47.52	4.16	8.75	1,096	15.88	6,902	145
1989	47.64	5.35	11.23	461	6.90	6,676	140
1990	49.14	3.21	6.53	657	9.97	6,579	134
1991	50.74	7.22	14.23	925	13.07	7,078	139
1992	52.40	7.85	14.98	840	11.90	7,055	134
1993	53.09	4.97	9.36	519	6.81	7,619	143
1994	53.81	6.70	12.45	980	14.11	6,945	129
1995	54.64	4.00	7.32	683	9.11	7,492	137
1996	56.37	2.78	4.93	295	3.13	9,432	167
1997	58.11	3.40	5.85	428	5.96	7,179	123
1998	59.88	4.76	7.95	545	6.00	9,010	150
1999	61.67	7.19	11.66	776			
2000	63.49	10.60	16.69	847			
Average		5.09	10.27	699	11.10	6,915	136

Source: FDRE (1996), DPPC reports, CSA and EC/LFSU

turmoil makes it peculiar and exemplary. For instance, roughly 5 million of the 30 million Africans vulnerable to famine in the mid-1990s were located in Ethiopia (Webb, et al., 1994). The country's crop production is mainly rain-fed[2], droughts have been followed by reduced agricultural output and reduced means of survival, especially for the rural population dependent on agriculture. Available poverty assessments indicate that the level of poverty is very high in the country. The FDRE (1998) estimates that the overall proportion of the population live under absolute poverty. It also notes that poverty rate is 33% and 47% for the urban and rural of the urban population, respectively.

There are many degrees of food insecurity, depending on the access to food by households. Considering the broadest level of average calorie needs, the Government set the minimal acceptable weighted average requirement per person per day at 2,100 kcal. On the other hand, in the late 1980s,[3] it was estimated that domestic food production provided about 1,620 kcal. Total availability, including imports, was about 1,770 kcal per person per day, or 16% below the minimal level accepted by the government. Considering this level, an estimated 52% of the country's population is food insecure, or exist below the poverty line (FDRE, 1996).

This document also discusses that both chronic and transitory problems of food insecurity are severe in

[2] For instance, only 0.6% of cereal production and 0.77 % of total crop production was irrigated in 1996/97 (Mulat, 2000)

[3] There are no indications for favorably and significantly improved status in the 1990s.

Ethiopia. The chronic food insecurity exists due to the high ratio of urban unemployment and limitation of rural landholdings, where more than one-third of the households farm less than 0.5 ha[4], which under rain-fed agriculture is inadequate for subsistence production of food crops. Lack of draft animals (oxen) intensifies the vulnerability associated with excessively smallholdings. One result of this chronic food insecurity is high levels of stunting in children, especially in the 18 months immediately following weaning, and more than one-third of children experience significant illness by the age of one year.

On the other side, there is transitory food insecurity arising from drought, displacement of people and refugee inflows. Drought in the case of Ethiopia, with its relatively high frequency, is, in fact, semi-structural and quasi-chronic. Moreover, in many areas of the country, there is an overlap of both elements of food insecurity, chronic and transitory, which expands the size of the vulnerable population.

As a result of these, in Ethiopia, there was no time when rural population has not been affected by drought, then famine. Table 1 shows the number of population principally affected by drought since the big famine of the mid-1980s: the highest figure is 10.6 million in year 2000, and the lowest is 2.53 million in 1987. Drought shocks, hence famine, have been a relatively common occurrences in Ethiopia. Currently, the probability of a drought shock occurring in Ethiopia is as high as one out of three years. Moreover, with a growing population, the magnitude of food insecurity is likely to increase with each event of drought.

Even during non-famine years, food consumption levels in Ethiopia are said to be extremely low. The figures commonly cited lie in the range of 1,500–1,750 kcal per person per day (Webb, et al. 1994). The same document, based on outcome of an empirical survey, has identified variability in food consumption levels and composition both within and across the study sites: lowlands and highlands. During 1989, the highest average consumption levels were in the highland areas, which are more prosperous than the others: an average of 1,932 kcal per person per day. However one of these sites showed 1,366; that was worse than the average of the poorest sample as a whole (1,693). All of the lowland sites of the study, on the other hand, were at or below the sample average in recommended dietary terms: an average of 1,755 kcal. Consumption levels of the poorest income group of the lowland sites of the survey were below 1,600 kcal, indicating extreme food deprivation even in the relatively good rainfall year of 1989/90. As a result, 68% of households were, on average, consuming less than 80% of the recommended daily allowance of 2,300 kcal. In other words, in a good production year, at least 68% of the sample households in these communities could be classified as malnourished. Consequently, the authors comment that this amount compares unfavorably with outcome of a survey conducted in The Gambia and Rwanda, which found only 18% and 41%, respectively, of households as calorie-deficient.

In addition to the drought-prone and the chronically food insecure parts of the country, seasonal food shortage is a common phenomena in every part of the country, usually from July to September. Reports of IDCoF (1999) and Getachew (2000) confirm this fact. The latter, for instance, reports that about 80% of the households in the study area face this problem annually, including in the climatically normal years.

Coping Mechanisms

Based on their experience in Ethiopia, Webb, et al. (1994) discusses three stages and actions taken to limit damages caused by food crisis: risk minimization, risk absorption, and risk-taking. The first stage involves insuring against risk in an environment of limited credit and insurance market. It involves measures of savings, investments, accumulation, and diversification. The next stage of coping involves a drawdown of investments, calling in loans, and searching for new credit. As capital for investment dwindles, consumption of food and non-food items becomes restricted, stores of food are drawn down, and the

[4] Mulat (2000) discusses that 63% of the rural landholdings are less than 1.0 ha and more than 37% cultivate less than 0.5 ha. Number of the landless households is also considerable. For instance, Getachew (2000) reports it to be 19% in North Shewa of Oromia. Amazingly, one year after the regional land redistribution, this proportion was found to be more than 17% in Simada district of the Amhara (Yohannes, et al., 2000)

number and variety of potential income sources available become crucial to survival.

The last stage of coping involves the collapse of normal systems of survival and the adoption of abnormal ones. At this point, the diet is dominated by unusual "famine foods" (roots, leaves, rodents), and households sell their last assets, including their fields, homes, and clothes. If they are still able to do so, some households break up and leave to search for assistance among distant relatives or at relief camps.

This sequence of events shows that many of the actions taken to survive become increasingly irreversible as conditions get worse. At the same time, households that progress along this continuum become increasingly vulnerable to a condition of crises. Unless conditions change or external help arrives, each coping action at best delays the onset of the next stage.

In the drought-prone parts of Ethiopia, since famine is more frequent, measures adopted by households to minimize risk are effective for only limited periods of time. Besides, not all of these measures are beneficial either to the household or to its environment. Desperate actions such as cultivation of marginal land or felling trees to sell as firewood have serious consequences for future environmental developments and income generation. Of all, the sale of children or the abandonment of elderly relatives is a sad way to have to cope.

Webb, et al. (1994) discuss existence of three main consumption responses to absolute food shortage in Ethiopia: the diet can be diversified to incorporate food items not normally consumed, the quantity of food consumed per meal can be reduced, and the number of meals per day can be reduced. These authors have reported that their sample households have adopted all these measures. The range of items and frequency of consumption at these survey sites rose considerably during the crises. In some areas, more than 95% of households supplemented their diets with "famine foods" such as roots, leaves, grass and rats. About 58% of households in the relatively higher income group have increased their consumption of "famine foods"; compared with only 41% of those in the lowest group. This is because the poorest households supplement their diet with berries and fruits even in normal years. In line with this, a study conducted in Pawe, Western Ethiopia, indicates that in case of food shortage, the native people consume more than seven types of wild animals (Betru, et al., 1996).

Getachew (2000) reports that in North Shewa of Oromia, similar to the group discussants, his sample households have reported sale of livestock (50%), wage work/migration (12%) and borrowing with high interest rate (10%) as their principal coping mechanisms. 'Selling' of one's landholding was also reported.

Related to this, Guinand, et al. (2000) discuss that in Ethiopia consumption of wild plants seems more common and widespread in food insecure areas where a wide range of species are consumed. These plants are consumed only at times of food stress and therefore an indicator of famine conditions. For instance, in parts of southern Ethiopia the consumption of wild food plants seems to be one of the important local survival strategies and appears to have intensified due to the repeated climatic shocks hampering agricultural production and leading to food shortages. The Konso people, for example, still have and use a well-developed knowledge concerning which wild-food plants can best provide a dietary supplement in periods of food shortage. These people have managed to cope with severe food shortage caused by harsh climatic condition by increasing their consumption of wild-food plants. Damaged, reduced or even lost crop harvests have been partly compensated by the collection of wild-foods.

Based on the study they have conducted in the southern Ethiopia, these authors have also placed wild food plants into four categories: typical famine food plants[5], wild-food plants with famine-food components, wild food plants attracting additional consumer categories during food shortage periods[6], and on-farm crops with famine-food components like immature *enset*, sorghum husk, etc. They have further reported that in contrary to the prevailing assumption, people have the

[5] From more than 80 wild-food species they have identified, about 30 were classified as typical "famine-food" plants.

[6] The majority of the wild food species encountered in the study are could be classified into this category. Children consume the fruits in normal times, but when food is short, they are consumed by the adults as well.

opportunity to collect wild foods almost throughout the year. However, this potential has not been encouraged and fully exploited.

There are some experiences of coping mechanisms of the pastoral areas as well. It is commonly said that Africa's pastoral households derive more than 50% of their income from livestock products – home-produced milk, meat, and blood. In Borana, south Ethiopia, in 1984, a decline in milk availability forced a dietary change. In 1982, milk contributed, on average, 55% of total calories to the diet of Borana households; by 1985 the contribution of milk fell to only 15%. This was compensated for by an increased consumption of blood, meat and cereals. Even though among these people as much as 40% of the daily energy intake of adults is obtained from blood, 42% of Borana households and 25% of Gabbra households sampled by Webb, et al. (1994) increased their consumption of blood during the famine year.

In general, these reports and the day to day experiences show that asset devastation, encroachment on the rapidly diminishing natural resources, leasing-out one's landholding, household break-up, displacement, desperate migration, reduction in the number of meals and in the amount of food consumed per meal, beggary and consumption of unusual foods are among the common forms of coping famine in Ethiopia. It is obvious that most of these mechanisms have irreversible and harsh consequences. Even though they are friendly to the environment and they can contribute to future sustainability, alternative coping mechanisms like food source diversification have been discouraged or have not been encouraged in the country.

EXEMPLARY FOOD HABITS OF THE REST OF THE WORLD

People around the world in general have a lot of interesting food habits that can be lessons for Ethiopians. In Europe and America, people use 2,000 to 3,000 food materials, mainly meat-based ones. On the other hand, the food materials used by Asian peoples are far more diverse and grains have an important position. The number of their food materials is estimated at more than 10,000 (Suzuki, 1997). On the other hand, it is commented that Africa in general is full of overlooked and under-developed food items that are not being fully exploited in the fight against hunger. Yet it is the home of more than 2,000 grains, vegetables, roots, fruits, and other foods that potentially could feed the continent and even other parts of the world. There is a good heritage that has fed people for generations stretching back to the origins of mankind. Strangely, this tradition has largely been overlooked in modern times (Ethiopian Herald, 1996). Even though research reports are not available for Ethiopia and in spite of the prevalence of this resource, the potential food materials exploited do not to exceed a few hundred.

Some populous countries like China, which once suffered from severe food security problems, have adopted a food source diversification policy and designed a strategy for it and they were successful with it. Consequently still many years after the 'Green Revolution', the number of non-edibles is small in China. Perhaps the same holds true for Mongolia, Korea, India, etc.

Domestic animals including equines and dogs are food sources anywhere, especially for the Far East. Pigs, rabbits, rodents, birds (e.g., ducks), etc. are efficient and cheap food sources throughout the world. In France, some species of frog are endangered due to intensive human consumption, hence protected. In the equatorial Africa, wild animals like antelopes, crossbows, monkeys and rodents are sources of food for households. Most of foods of animal origin still come from the forest, i.e., from wild animals, birds and fish (CTA, 1995). In the central part of Africa some wild animals are at risk of extinction due to intensive human consumption.

Different types of vegetables and fruits, numerous in numbers, are cheap, efficient, and healthy food sources of most parts of the world, especially Asia, Europe, and North America. Some foods like mushrooms are not affordable to the poor in the developed world. CTA (1995) discusses that wild fruits, vegetables and root crops are food sources in most parts of Africa as well. However, this is not a case for Ethiopia.

It is reported that there are over 2,000 recorded edible insect species in the world. Beetles, butterflies, moths, bees, ants, wasps, grasshoppers, and bugs are most commonly eaten. Although 'entomophagy', the eating of insects, is recorded from France, Italy, Germany, and the United Kingdom to all countries in Africa, the Americas and the majority of Asian countries and Australia, it is most common in tropical and subtropical countries. In some villages in the Democratic Republic of Congo, it is reported that insects are the source of up to 81% of ingested animal protein. Of course, insects can be terrible crop pests, but, in some cases, these same pests are edible and could be used as food sources and sometimes are. Nutritionally, insects can be good sources of protein, vitamins, minerals and even fat. Their protein content, on a dry-weight basis, mostly varies from 30% to 81% (CTA, 1998). Besides, agate snails, termites and the caterpillars of several species of moth are the other food items (CTA, 1995).

In Ethiopia, these foods are either taboos or not traditionally consumed or consumption is discouraged. On the other hand, they are not only abundantly available, but some of them are also the principal threats to food production in the country. For instance, monkeys, pigs, porcupines, warthogs and some birds cause significant crop loss. Termites are reported to cause damage on every plant and natural buildings and to have severely affected considerable number of households in some parts of the country like in West Wollega. Further, the amount of crops lost annually due to armyworm outbreaks is broadly known to be substantial.

AN OVERVIEW OF FOOD SOURCE IN ETHIOPIA AND ITS TREND

Latest comprehensive study on food sources used in the country is lacking. In spite of this, attempts made to review some fragmented works that appeared in a couple of reports. Guinand, et al. (2000) comments that Ethiopians generally are constrained to the consumption of the commonly cultivated crops and neglect wild plants some of which have clearly demonstrated their production potential. Unlike many other African countries and especially many Southeast and east Asian countries in general, Ethiopians do not consume animals like ducks, pigs, donkeys, horses, snakes, rabbits, rats, cats and dogs. And this means that the range of food available to people during times of stress is narrowed considerably despite Ethiopia's rich biodiversity.

An FAO document, has categorized former Ethiopia as a major consumer of wheat (FAO, 1996). However, some reports put *teff* (cereal indigenous to and consumed only in Ethiopia) as the principal food of the country. For instance, as to EFC (1991), *teff* provides 50% of the total calorie intake of the people. Different from these two, (Webb, et al., 1994) reports that the most common sources of calories consumed by their sample households in the different parts of the country were maize and wheat, representing 51% and 10% of total calories, respectively. Sorghum and pulses were next in importance at 8% each. *Teff*, barley and more expensive calorie sources, such as meat, oil, and sugar, each contribute less than 5% to the total of calories consumed.

EFC (1991-cited Ruth, et al., 1971a) reports that in the northern part of the country (Tigray), leavened bread (*injera*) made from *teff* and the sauce (*wot*) made from pulses are the main dishes in most parts of the communities. The food taboos in this region include wild animals such as pigs and birds. After three decades, this pattern does not seem to change though consumption of wheat and vegetable oil has been increased due to the intensive food aid operation undertaken in the region since some two decades ago. The same document (cited Ruth, et al., 1971b) reports that cereals are the major staples in Arsi, in the central part of the country, Arsi. The food taboos include fish and most of the wild animals such as pigs and birds. Other taboos include the front legs of animal, its hearts, tongue and intestine.

This document further indicates that in some parts of the country like the present Sidama, food taboos are very strong and, fish, the heart, and liver of an animal are forbidden (EFC, 1991 — cited Ruth, et al., 1971c). Observations indicate that cereals like maize and *enset* constitute the major portion of diet of this part of the country.

Report of a research conducted in Ethiopia (Webb, et al., 1994) indicates differences between famine and good year consumption patterns of the country: for instance, observation of the consumption of the most expensive, *teff*, and the least expensive, maize. More households consume *teff* during good years than the famine ones. It is common knowledge that consumption of some of the important foods like cabbages, potatoes, *enset*, roots, tubers increased during famine and food shortage seasons, especially in the rural settings. During such times, foods reported as "famine foods" are consumed. However, since their consumption is highly discouraged, the practice is kept as a secret.

It is common knowledge that cereals are the main dietary components of Ethiopians. However, preferred choices of cereals vary. Though it is more expensive in all of its aspects *teff* is the most preferred cereal. One important reason is its suitability to prepare *injera*. On the other hand, production and processing of the crop demands higher labor input while it is the least productive. Production of *teff* also contributes to soil erosion. In spite of these negative attributes, Ethiopians prefer *teff*. As *teff* has color varieties, the white one is more prestigious, hence more expensive. Therefore, with increased income and social status people increase their consumption of white *teff*. Historically, however, once *teff* by itself was a 'famine food. Due to the expanded production and due to the fact that it is food aid commodity, consumption of wheat is also high in the country. The most productive and the cheapest crop, maize is broadly consumed by the low income Ethiopians. Due to increased poverty, reduced landholding size, high productivity of the crop and ease of its production and processing, production and consumption of maize seem to have been increasing slowly. Production and consumption of sorghum and millet, the two drought tolerant and better performing crops have been declining, though sorghum is the most preferred cereal in the eastern part of the country (Hararghe).

Pulses in general are still required and preferred principally to prepare *wot*. However, as supply of these crops has failed to keep up with the need, attempts are made to adapt different mechanisms. For instance, Guinand, et al. (2000) report that, a grass pea also called chickling pea or vetch (*guaya/gayo*), initially introduced as fodder to the northern part of Ethiopia is now known as famine food plant and it is broadly used for *wot*. Even though there are attempts, the potential and possibility existing to substitute pulses with vegetables has not been exploited. So far this is practiced by the educated urbanites occasionally and the tradition is developing very slowly. Especially, it is less developed among the rural people who are the major consumers.

In spite of the immense natural potential existing for it, vegetable production and consumption is less practiced in Ethiopia. With this regard, EFC (1991) discusses that vegetables such as potatoes, onions, cabbages, cauliflower and spinach are not commonly eaten in Ethiopia. For instance, in some parts of the southern region of Ethiopia like Sidama, local cabbage is the only vegetable used. Mulugeta (1992) has also reported that pumpkin is the only vegetable available and consumed by the Dasenech and the Hamer people in southern Ethiopia. Consumption of aleko, a tree tastes like local cabbage, is limited to some parts of south Ethiopia such as Males (Mulugeta, 1992) and Wolaytas (personal communication). On the other hand, this plant is a marketable food in some western African countries like Sierra Leone. Even though Webb et al (1994) report that these plants are famine foods, some grasses constitute diets of some people in the southern Ethiopia. Certain types of grasses, such as antara and donki, are regularly consumed by people in Males (Mulugeta, 1992).

In general, consumption of vegetables is not or less practiced by the majority (the rural). To this group of society, in most cases, only the local cabbage, pumpkin and potatoes are broadly known. May be an exception could be the *enset* which grows in areas where the local cabbage is consumed broadly. One important problem in this regard is that in Ethiopia, production, consumption and processing of vegetables is less developed. In the central and northern parts of the country, consumption of these food sources is traditionally associated with famine and they are considered to be foods of the lower class.

Similarly, production and consumption of fruits varies from place to place. In general, however, the daily average intake is very low, providing only a small amount of the total calories. Some exceptions are found in areas where banana, mango and orange are grown in abundance (EFC, 1991). Even though there is conducive potential to grow these crops in many parts of the country, the potential growers, the peasants, are not aware of them and wherever they are aware, they lack planting materials.

Starchy roots and tubers are next in importance to cereals in the diets of much of sub-Saharan Africa, particularly in the humid zone. They make up an important part of the food basket in the sub-region and they are the most competitive source of calories and protein (Abalu, 1997). In Ethiopia, especially the southern and southwestern part, there appear to exist underutilized high potential in terms of production, consumption and knowledge of these crops. However, in some cases they are emphatically used to cop with food shortage times rather than constituting the regular dishes. In the central and northern parts of the country, they are not/or less known and not or less consumed.

Enset[7], unique to Ethiopia is cultivated in the southern and southwestern parts of Ethiopia as a food and fiber crop. An estimated number of 10 to 12 million people depend on it as a staple and co-staple food. In this part of the country, it meets the productive and security objectives of the farmers. Even under risky and variable ecological and socio-economic conditions, *enset* has proved useful to a sustainable intensification of agriculture. Reports and personal observations indicate that the populations that are dependent on *enset* have never suffered from famine, even during the famines of the 1970s and 1980s (Shiferaw, 1996). However, in spite of its merits and potentials, production and consumption of this crop has been limited to the above mentioned parts of the country. No successful effort has been made to extend the crop to the more food insecure parts of the country. Shiferaw (1996) and Mulat (2000) discuss that even in its home area, cultural practices of production of this crop have not shown any improvement, and its performance has been declining due to diseases, wild life attack and declining soil fertility.

In general, diversified production and consumption of vegetables, fruits, root crops and tubers in Ethiopia has been constrained by discouraging traditions/culture, lack of awareness and lack of the materials (unsatisfactory performance of the extension).

The other area of food selectivity is coffee. Ethiopia is not only a producer, but also the homeland of coffee (*Coffea arabica*). Mulat (2000) discusses that coffee bean production in the country, although said to have grown by only 1.6% during 1990/91 and 1997/98, has reached about 230,000MT in 1997/98. On the other hand, the country is also known to be the top consumer of the crop. In spite of the fact that it constitutes about 60% of the country's foreign exchange earning, only about half of the total coffee production is exported while the balance is consumed domestically. Though it can grow in almost all parts of the country, coffee is produced in limited regions but consumed equally all over the country. This heavy consumption of the bean has been affecting hard currency earning capacity of the country which otherwise could have been used to gain more access to food and to enhance domestic food production and efficient utilization.

Some coffee consumption habits practiced in some parts of the country could contribute to reduced consumption of the exportable coffee bean. Mulugeta (1992) reports that the Gofas in south Ethiopia use coffee leaves (*tuke*) while Males of the same region use both bean and leaf of coffee. Similar to this, according to personal communications, in Sheko the people use coffee leaf, not the bean, to brew coffee that is locally called *chemo*. Further, in Hararghe the native people do not use coffee bean. Instead, coffee leaf (*quti*) is used to prepare *hoja*. The Somalis use external coat of coffee bean (*ashara*) that they import from coffee producing parts of Hararghe to brew coffee. Similar experiences prevail in different parts of the country. Nevertheless, these useful traditions have not been encouraged and promoted. Had this

[7] It is said that similar to *teff*, initially, it was domesticated in response to severe famine.

been the case, consumption of coffee bean could have been reduced and this in tern could have increased the amount of coffee beans exported.

In spite of potential existing for it, production of tea is limited to two medium sized commercial farms. Tea consumption is largely limited to the urban areas. If promoted among and adopted by the rural people, this crop could reduce consumption of coffee.

The other big concern of this topic is the case of the animal protein sources. EFC (1991) discusses that in principle, the daily intake of proteins should provide 10%–15% of the total intake of calories. The average Ethiopian diets, however, are abundant in cereals, very poor in vegetables and animal food. Consequently, such diets generally lack animal proteins which have the highest biological value and are prerequisites for the maintenance of good health. The paper comments that, as a result, most Ethiopians suffer from a lack of protein and vitamins, a fact that corroborates to the low nutritional status of the population and the high morbidity and mortality rates. On the other hand, consumption of some of the animals that are relatively cheap and efficient sources of protein like pig and fish are either taboo or discouraged.

It is commonly reported that Ethiopia stands first in Africa and tenth in the world in the size of its livestock population. However, recent reports indicate that the number of cattle, goats and sheep has declined substantially principally due to the scarcity of grazing area (such land is increasingly converted into cropland) and drought (Mulat, 2000). This author further discusses that the quantity of livestock products, such as milk, meat, and eggs, is not encouraging: annual growth rates have rarely exceeded 1%. The per capita meat production, which stood at 9.4 kg per head per annum in 1980/81, decreased to 7.4 kg in 1996/97. Similarly, per capita milk production declined from 27.6 litters per head to about 22 liters over the same period.

Among the rural Ethiopians and the poor urbanites, meat in general is consumed during major festivals such as important religious days, the end of fasting or other celebrations. In line with this, (EFC, 1991) reports that meat, including poultry and eggs, provide only 3.4% of the total calorie intake while milk and milk products provide about 2% of it. The same document reports that in southern Ethiopia (Sidama), for instance, the intake of protein was far below the recommended standard by about 60%. The supply of animal protein was only about 2% of the total protein intake.

Some of the animals and animal products that are important and affordable sources of food, which otherwise could have contributed to improvement of food security status in the country are taboo in Ethiopia due to one or another reason. Among highlanders and the northern Ethiopians, only cow's milk is usable while that of the other animals is taboo. In some areas, however, diversified milk sources are used. For instance, both goat and cow's milk are used by the Daseneches and the Males; in addition to these sheep milk is used among the Hamer people and the Guji Oromos in south Ethiopia (Mulugeta, 1992). This author also reports that the Borana Oromos consume cattle, goat, sheep and camel's milk. Similar to these, cow, camel, goat, and sheep's milk are used in the eastern lowlands of the country by the Somalis and the Oromos. If such diversified milk sources are used in the highlands where number of livestock (other than camel) is larger, the amount of consumable animal protein could be increased.

The other animal product that is necessary is blood. Similar to some other parts of Africa, blood constitutes food material of several people in Ethiopia. For instance Mulugeta (1992) reports that extraction (harvesting) of blood from healthy and strong live cattle for consumption purpose is a common practice among the Dasenech, Male, Konso, Gofas and Hamer people of south Ethiopia. By this process, fresh blood is consumed either alone or mixed with fresh milk. This author also reports that the Aris, Konsos and Gamos consume blood that is extracted from slaughtered cattle sheep or goat mixed with fat or alone. The author further discusses that the Borana and the Guji Oromos consume blood that is extracted both from life (healthy and strong bulls and heifers) and slaughtered cattle. Blood is used by these people during both normal and severe food shortage years as a coping mechanism (Webb, et al., 1994). Informal communications

indicate that blood was common food material for Oromos and southern people. However, in spite of its considerable advantages, as it is not consumed by the 'dominating' nations of the country (the north), blood consumption has been discouraged. If it is encouraged and promoted, potential contribution of this food material is immense in the highlands of the country where number of livestock is higher.

Fish is the other important animal protein source that is underutilized in Ethiopia. This country has got substantial aquatic resources consisting of more than 7,500 km^2 of lakes and 7,000 km of rivers. In addition, minor water bodies such as crater lakes make up about 400 km^2 that are stocked with various fish species (Eshete, 1996). This document further discusses that in spite of absence of comprehensive data related to the size and composition of the present fish stock and the inconsistency of the available ones, fish production potential of the country is in the range of 33,000–82,900MT per year. On the other hand, the annual nominal domestic production is approximately in the range of 3,500–4,500MT. This makes the utilization rate only 5–10% of the potential, and this means that per capita consumption has never exceeded 75g per year. Compared to the case of the other African countries, (8.4 kg per person per year) and the western countries (13.4 kg), fish consumption in Ethiopia is far too low. If properly exploited, fish can substantially decrease the broader food gap prevailing in Ethiopia.

This author also comments that the traditional food habit has adversely affected fish consumption in Ethiopia. In line with this, a baseline survey conducted in Alefa Takusa, a district that borders Lake Tana in the west, indicates that the huge potential existing for fisheries development in the district has been constrained by factors that principally include lack of awareness among the community and cultural taboos towards fish consumption (IDCoF, 1999). Similarly, Webb, et al. (1994) have documented that the Afars and Arsis in Ethiopia had refused to eat fish during the 1973/74 famine. In general, the consumption of fish is negligible even in the lake areas. For instance, around reservoirs like Fincha, to where fish was introduced lately, it is consumed, especially by the native people. Traditionally, in Ethiopia consumption of fish increases during the long fasting period of the Orthodox Christians, these days it is forbidden or discouraged by leaders of the Church. This further reduces exploitation of this huge potential very significantly.

The food security program, issued in 1998, encouraged fish production and consumption through ensuring access to necessary production inputs and distribution networks. In the day-to-day life, however, efforts and achievements are not observable. Popularization of fish consumption could substantially improve the food security status of the country.

Poultry is another food source that is under-utilized. Poultry constitutes about 8.6% of the world's meat production (Holness, 1991). Ethiopia is endowed with natural environment that is conducive for different types of birds. Only chicken and one or two hunted wild birds are edible in Ethiopia. Even chicken is not consumed in some parts of the country. For instance, Mulugeta (1992) has reported that chicken is not consumed among the Dasenech, the Guji and the Borana Oromos, the Konsos, the Gofas, and the Hamer people of south Ethiopia. The principal reason given for this is that chicken eats dirt and in some areas (Hamer) it is a newly introduced domestic animal. Among the Konsos, adults do not consume chicken eggs. Similarly, during interviews conducted in Gilo Abole in Gambela in the mid-1980s, chicken was not consumed by the native people.

Poultry in general is an economic venture with relatively easy entry. This activity could be an affordable source of animal protein. One problem in this regard is that in Ethiopia only a less productive species of chicken is kept and consumed and no effort has been made to change this tradition. In other parts of the world, chicken is only one of the many edible domestic and wild birds. Another problem in regard to chicken is that it is traditionally used in only one dish, doro wot. The resources required to prepare one *doro wot* are very high: estimated to be about Birr 50. Introduction and promotion of the production and consumption of the more efficient types of birds and recipe diversification and simplification could increase the contribution of poultry to the country's food economy.

Another important protein sources for both the developed and developing countries are equines. In the developed countries, it is an expensive source of food. In some Far East and Latin American countries, all equines are consumed. In Ethiopia, regardless of their abundance, these food sources are taboo. Mulugeta (1992) however reports that donkey, the only equine known to the area, is eaten among the Geleb people in south Ethiopia. The Burjis on the other hand do not eat equines, because, reportedly, the flesh of these animals is sour. This indicates the possibility to promote consumption of these animals among some people in Ethiopia during both normal and food scarce times.

Pigs are the most efficient and affordable sources of animal protein in the world. They constitute about 48% of the global meat production (Holness, 1991). In Ethiopia, they are not only wild but they attack field and garden crops. In different parts of the country, though they are difficult, these animals are hunted for human consumption. Few individuals in few towns of Ethiopia keep some domestic pigs. Promotion of this activity, especially among the smallholders has not been considered. Consequently, although pork is relatively cheaper in the developed world, due to the scarce supply, higher running costs and other reasons it is unaffordable in Ethiopia. For instance, pork costs about Birr 30 per kg while beef ranges from Birr 8 to Birr 20 per kg depending on place and quality. One important constraint to promotion of pig husbandry and consumption in Ethiopia is religion, but this is not the case for about 18% of the population.

In some African countries all wild animals are incorporated in the diet. As to the recent edition of "African journal" on Ethiopian Television, monkey and apes are important and marketed food sources in some African countries. This action has threatened existence of some of these wild animals like baboons. In addition to the few commonly consumed wild animals like antelope and pigs, warthogs, porcupines and hippopotamus are consumed in the south and southwestern Ethiopia (Mulugeta, 1992). In rare cases, some of these animals, like porcupine and warthog are consumed in some areas of the eastern Ethiopia, while pig and warthog, are hunted for human consumption in western Ethiopia. There are also indications that some people ate apes, monkeys and some reptiles at least until the mid-1980s. Addis, et al. (1993) and IDCoF (1999) has documented that the minority group called Weitos[8], who settled around Lake Tana, ate some animals like crocodile and hippopotamus until some years ago. Though they were not consumed by the surrounding majority, the Amharas, these are foods in other parts of the world. For instance, as there is international demand for crocodile, both meat and skin, Ethiopia is undertaking small crocodile farm for export market.

As to personal observation, in the mid-1980s, in the present Gambela, at an area specifically called Gilo Abol, some items such as rodents and several wild animals were important food sources of both normal and food shortage times, though the present situation is not known. Similarly, before and during the period of state farm expansion, in the present East Wollega (Dhedhesa valley), the native people had numerous food sources that included a number of wild animals, rodents, reptiles, wild roots and fruits. With the expansion of state farms, cereals replaced the traditional food sources of the native people. The same situation holds true for some areas in Metekel and in southern and southwestern parts of Ethiopia.

One general truth, however, is that these wild animals are important threats to food production. They cause considerable crop loss and their scaring requires considerable human labor. For instance, Shiferaw (1996) reports porcupines, pigs and moles to cause *enset* production problems for about 92%, 80% and 41%, respectively, of his sample households in North Omo. These animals, attacking the best quality *enset* plants, have limited *enset* farming to homesteads.

It seems that there is a possibility to promote domestic production of some of these animals, like pigs. Besides, if consumption of some others is encouraged or at least not discouraged, they can be important sources of animal protein and can contribute to

[8] Eshete (1996) reports that in Ethiopia, lake fisheries using hand-made nets and traditional reed boats (tanquas) was started on Lake Tana by the Weitos in the early 18th century.

mitigation of the prevailing food shortage. However, care still needs to be given to the endangered wildlife.

In general, Ethiopia is a country in which more than 80 nations and nationalities and hundreds of ethnic groups live together. These nations and nationalities and groups have there own food materials and food habits. Report of a study made by Mulugeta (1991) confirms this statement; although his work was limited to food habits of a few nations, nationalities and ethnic groups that live in the southern part of the country. In spite of this fact, food habits and food materials used in the country are being narrowed down to few food sources that are relatively expensive and comparatively less efficient. From the cereals, *teff* and from the animal food sources occasionally beef and usually mutton are more preferred by the "haves" who the "have-nots" try to follow as role model. Factors that are behind this problem have not been systematically studied in the country.

FACTORS HINDERING FOOD SOURCE DIVERSIFICATION IN ETHIOPIA

Guinand, et al. (2000), based on the study they have conducted in southern Ethiopia on wild food plants, comments that in this country, strong traditions, beliefs and religious taboos still obstruct people's psychological and mental willingness to domesticate and cultivate wild food plants. They further advise that this is the reality that cannot be denied and has to be confronted if the full potential of the indigenous Ethiopian flora be effectively exploited as a food source.

Religion

According to results of the 1994 census, 50.6% of residents of Ethiopia are Orthodox Christians, 32.8% are Muslims, 10.2% are protestants[9], 4.6% are followers of traditional religions, 0.9% are Catholic Christians while other 0.9% are followers of some other religions. In general, the majority of minority nations and nationalities are followers of the traditional religions[10]. In this country, as in others, religious belief plays a dominant role in influencing when and what is normally fit for human consumption. It is one of the factors that causes significant variation in the normal food habits and dietary patterns of the different regions of the country. Religions determine not only the type of foods that could be eaten and that could not, but also when the edible ones could be eaten and when they could not. Among the Orthodox Christians, due to regulation of the church, a number of foods are not eaten. These, among the others, include pigs and equines. Besides, consumption of every animal food is forbidden on Wednesdays and Fridays and during fasting periods. Even though it had not been the case, number of these fasting periods has increased even for the ordinary members of the church. Similarly, even though it had not been the case, lately, fish consumption on the fasting days is discouraged. These restrictions are very mild for the Catholics and do not exist among the other Christians. Related to this, Guinand, et al. (2000) comments that the Orthodox Church of Ethiopia represents a major non-negligible constraint to the use and consumption of wild plants and animals.

Leaving aside the argument regarding whether the restriction or the permission is biblical or not, the restriction has contributed to the food insecurity status of the country. The contribution has increased with the increase in fasting periods. In case of famine, however, these restrictions are hardly obeyed. For instance Webb, et al. (1994) discuss that all of the households in Debre Berhan, Dinki, and Gara Godo (who are followers of the Ethiopian Orthodox Church) had suspended the Orthodox fasting rules, which dictate that meat and dairy products be avoided on 150 days of the year, during the 1973/74 food crisis.

Similarly, the Islamic religion forbids consumption of some food materials including pork, blood and some wild animals. Obviously, this affects nutritional status of the people and it also limits the coping capacity of individuals in the case of food shortage. For instance,

[9] Includes the Seven Day Adventist, Pentecost, Lutheran, Baptist, Anglican, Meserete Kiristos, Mulu Wengel, Kale Hiywot, etc.

[10] For instance, about 74%, 71%, 85%, 65%, 96%, 63%,74.4% and 98% of the Bench, Dasenech, Hamer, Konso, Mursi, Sheko, Male and Suri, respectively, are followers of religions labeled as "traditional."

among the pastoralists in southern Ethiopia, the Gabbra (Moslems) generally refuse to eat the meat of animals that have died of hunger or diseases. None of the households surveyed by Webb, et al. (1994) admitted to eating such meat during the famine, but 92% of the Borana, who are neither Moslems or Christians, did use this source of food in 1984/85. Similarly, although the Gabbra formerly drank blood as a regular part of their diet (as the Borana still do), a Gabbra council has proclaimed that 20 years ago drinking blood was sacrilegious. As a result, only 25% of Gabbra households sampled increased their consumption of blood during the famine, compared with the 42% of Borana households. In line with this, before the Islam became stronger in the area, blood and several wild animals were eaten in different parts of Hararghe, eastern Ethiopia.

On the other hand, Guinand, et al. (2000) discusses that in the southern part of Ethiopia, where there are many nations and nationalities and tribes still living with their indigenous beliefs and traditions, there are fewer religious and external constraints than in the other parts of the country. In these areas, the daily diet of most people still comprises an element of wild-food, both animals and plants, during certain periods of the year. This indicates the possibility of relaxing this constraint.

Lack of Awareness and Access

The other factor that has contributed to the limited food sources of the people in Ethiopia is their lack of awareness about and access to existing and usable food materials. Sometimes people lack information regarding existence of some acceptable and potentially edible food materials and when they become exposed to it, they positively institutionalize it. At other times, they lack access to food materials that they have approved to be acceptable. In the case of temperate zone fruits and peasants in North Shewa could be an example for this (Getachew, 2000) [11]. In many cases, people have accepted fruits and some vegetables to which they are exposed. Nevertheless use of these materials is often constrained by absence or scarcity of the materials. In general, unavailability, inadequacy or high prices of foods and planting materials have been problem. The higher price of pork could also be an example.

Absence of Encouragement, Promotional and Advocacy Efforts

Absence of effort to promote and encourage consumption of the potentially and socioeconomically edible foods like fish both by the governmental and non-governmental organizations are among factors that contributed to the problem. Such efforts have not been addressed by policy, program or strategy of any of the appropriate government institutions. Domestication and consumption of the 'wild' food materials, which on the other hand have been used to cope with food shortages, has not been advocated or encouraged. Food habits of some people that at present are not acceptable to the dominant ones has not been encouraged and advocated. Some coping mechanisms employed by people during food shortage times and newly adapted food materials, like vetch, have not been encouraged. Undoubtedly, such activities could diversify the diet and reduce vulnerability.

Absence of research and extension

Research into the adaptability of potentially usable food materials is lacking; this hinders food source diversification. Extension efforts have also not been meaningful to introduce and disseminate new food materials that are efficient food sources and at the same time compatible to circumstances of the producers. Fruits and vegetables, fish, pig, and poultry are examples.

Social and Political Arrangements

In Ethiopia, since formation of the empire at about end of 1800, the northern settlers had political, religious and cultural dominance over the center and the south. The same has been true for the food habits and food sources. Consequently, it is obvious that food habits of the people inhabiting the northern part of the present Ethiopia, principally the Amharas and the Tigrays has influenced and changed that of the other people in the country. As a result of this, traditional foods of the south people like blood, roots and tubers, milk, some wild plants and animals were discouraged

and pushed to the borders. Maybe, it is due to this that some food habits and food sources are still prevailing in the most southern, southwestern and western parts of the country.

On the other hand due to the political, religious and cultural pressures and as a strategy to cope with subjugation, the dominated nations and nationalities have dropped their traditional food habits and important food sources that were not liked/approved by the dominating. Therefore, it was not only dominance of north per se, but also failure of the south to resist the domination and to maintain their traditional food habits and food materials is the other reason for the current highly narrow food sources.

Culture and Tradition

Cultures and traditions determine what people will or will not eat and dietary patterns remain strongly influenced by the history of peoples and their culture. In Ethiopia, it seems that next to religion, culture and tradition have caused people to narrow their food habits. For instance, there is no religious limitation on consumption of roots, tubers, vegetables, some wild animals, rodents, fish (for the non-Orthodox and non-fasting), insects, reptiles and birds. These have not been eaten in Ethiopia principally due to culture and tradition of the people. These food items are traditionally perceived to be of inferior quality and taboo. In general, the food habits of Ethiopians lack openness to new food materials that are consumed by other people. Still, culture and tradition of the north has impacted on this. This situation has been observed to have a damaging effect on the people. For instance, during the tragic droughts, attempts made by famine relief workers to substitute some foreign cereals like rice for *teff*, have failed, partly because the people were suspicious of an unfamiliar food (EFC, 1991). Related to this Guinand, et al. (2000) commented that in Ethiopia, wild foods are considered to be a low-status food and its consumption is regarded as a source of shame. On the other hand, there is a possibility to promote diversified food sources and food habits of the other nations and nationalities of the country.

Personal Characteristics

Personal characteristics like age and sex also determine food habit of and food materials used by the different members of certain community. Often traditionally, children are forbidden to eat certain food materials. Similarly, adults drop some food materials which they ate when they were younger. In the rural areas children eat a number of wild fruits, roots, leaves, twigs or other plant parts, but they avoid all or most of them when they grown-up. Further, in urban settings, children raise and eat domesticated pigeon, but they avoid the practice when they become adults. This indicated that as people get older and are more exposed to the culture of their society, they avoid certain foods. This also indicates that children and adults have different coping mechanism to famine. For instance, in Girawa (E. Hararghe), to overcome hunger, children were observed consuming succulent twigs of a perennial plant locally called *dhangago*, but this was not the case for the adults who also once consumed this plant during their childhood. In line with this, Guinand, et al. (2000) discuss that in rural areas of Ethiopia, children consume wild-foods[12] (usually referred as famine-foods) very commonly. Even during famine times, first children and then women collect wild food plants when the latter are responsible for the preparation. As the able (usually male) members of the victimized household migrate for work, famine food collection and consumption is left for children and women.

Gender also determines the type of food that is consumed by members of certain community. In certain societies, for instance in some parts of Oromia, girls are not expected to drink milk. Obviously, these situations affect food security status and coping capacity of these particular members of the community.

[11] As a component of its diversification of the local mixed farming, a project (GTZ/LUPO) has introduced such crops to the high altitude parts of the zone. Even though the fruits were new to every one, they have been accepted by all and it has been difficult for the project to satisfy the need for the planting materials.

[12] Such foods include fruits from *Ficus* spp, *Carissa edulis* and *Rosa abyssinica*.

Exposure and Economic Growth

Actually, economic growth brings changes in food habits. Modifying diets depends on economic changes and societies' levels of exposure to foreign ideas, goods and peoples. Accordingly, some changes in dietary patterns were observed.

Likewise, in Ethiopia, change of food habit has been observed together with economic development and exposure to the outside world. Mostly, cereal, beef and mutton consumption has influenced that of the better-off urbanites in Ethiopia. However, the diversified food sources of the developed world like consumption of pig, frog, rabbit, and birds have not been adapted.

CONCLUDING REMARKS

The chronic food insecurity status of Ethiopia is a long lasting phenomenon. In response to this disaster, different coping mechanisms have been employed. Food source diversification through domestication of *teff* and *enset*, food materials unique to Ethiopia, is among the many examples. It seems that the increase in the level of food shortage, the fast growth the population and the decline in the performance of the utilized food resources have necessitated further domestication and adoption of others. The diversified natural endowment of the country on one hand and the different food habits and food materials used by the numerous nations and nationalities and ethnic groups of the country on the other are indications for existence of potential future domestication and adoption and diversification of food sources. Some of these materials are already used to cope with the food shortage situations. Still, there is also a possibility to introduce foods of other parts of the world that are not known or utilized in Ethiopia on a large scale. This clearly means that food source diversification is an untapped potential that could substantially contribute to amelioration of the chronic food insecurity prevailing in Ethiopia.

However, this has been constrained by factors that include religion (principally Orthodox Christian and the Islam), lack of awareness about and access to usable food materials, absence of encouragement, promotion and advocacy efforts from concerned institutions, social and political arrangements, and economic development.

Reversing this situation in order to reduce food insecurity requires joint and synchronized intervention of the different agencies of the government, the non-governmental and other agencies, the elite and the public at large. Areas of the intervention could include the following:

- Promotion and advocacy of 'abnormal foods' or 'famine foods' during normal times so that they could increase the stock of food available for the household;
- Study the ignored and contemporary food materials and food habits of the peoples of the country, especially the minorities, and encourage the people to maintain their traditional food sources and food habits and to develop confidence in them;
- Consideration of food source diversification, adoption of new food sources and promotion of the use of the discouraged (not encouraged) ones in policies, strategies and programs;
- Introduction of foods from other parts of the world that are potentially usable and promotion and support of their use;
- Systematic study of the present 'wild-foods'/ 'famine foods' and the traditional food sources and food habits of the people, especially the minorities.
- Arrange discussions regarding the issue of religion, culture, food sources, famine and death.

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DISCUSSION/COMMENTS FROM THE FLOOR

1. It appears that whilst religious taboos are flexible in times of chronic food insecurity there are a number of cultural beliefs that severely hamper the diversification of food types and sources. The taboo of the consumption of blood by the Gabbra people discussed in this paper is one example. There is a strong case for awareness programmes to address some of these issues.

2. The percentage contribution to the diet that IWFPs and other 'wild foods' make clearly differs not only across gender, age and wealth groups but also seasonally. In southern Sudan before the war, IWFP consumption was estimated in the range of 5–10%. During the famine of 1998 it rose to a range of 35–60%. Current estimates are of 20%, although in areas such as Yambio where there is a cereal surplus, wild foods are consumed less. Fishing communities who eat mainly fish and water lilies could characterize 'wild foods' as making up 100% of their diets. In many cases, insects make a significant contribution to the protein intake of communities. For example, in north-east Zambia during the hungry season, termites account for 40–60% of protein intake.

Session 3: January 24

Chair: Monica Opole

Wild-Food Plants in Ethiopia: Reflections on the Role of Wild Foods and Famine Foods at a Time of Drought

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INTRODUCTION

Background

For many years the importance of wild plants to subsistence agriculture in the developing world as a food supplement and as a means of survival during times of drought and famine has been overlooked. Generally, the consumption of such so-called wild food has been and still is being under-estimated. This may very well be the case for Ethiopia, a so-called 'biodiversity hot-spot' and known as a centre of origin for a significant number of food plants (Bell, 1995).

Rural people of Ethiopia are endowed with a deep knowledge concerning the use of wild plants. This is particularly true for the use of medicinal plants (Abebe and Ayehu, 1993) but also for wild plants some of which are consumed at times of drought, war and other hardship. Elders and other knowledgeable community members are the key sources or 'reservoirs' of plant lore. Wild food consumption is still very common in rural areas of Ethiopia, particularly among children. Among the most common wild plant fruits consumed by children are, for example, fruits from *Ficus spp, Carissa edulis* and *Rosa abyssinica* plant species.

The consumption of wild plants seems more common and widespread in food insecure areas where a wide range of species is consumed. The linkage has given rise to the notion of 'famine foods', plants consumed only at times of food stress and therefore an indicator of famine conditions. Local people know about the importance and the contribution of wild plants to their daily diet as well as being aware of possible health hazards such as stomach irritation occasionally occurring after consumption of certain wild plants.

Nevertheless, whereas the rich indigenous knowledge on the medicinal use of wild plants has been relatively well documented, research, particularly concerning the socio-economic, cultural, traditional, and nutritional aspects of wild food plants, still lacks adequate attention. In the case of Ethiopia little, if anything, has been systematically documented on this subject. This should raise even greater concern when looking at the frequency of recent famine events in the country and the extent to which subsistence agriculture is still the norm.

In parts of Southern Ethiopia the consumption of wild food plants seems to be one of the important local survival strategies and appears to have intensified due to the repeated climatic shocks hampering agricultural production and leading to food shortages. Increased consumption of wild foods enables people to cope better with erratic, untimely rains and drought without facing severe food shortages, famine and general asset depletion as in other areas of Ethiopia (see also Mathys, 2000). The key to this strategy for survival is the collection and consumption of wild plants in uncultivated lowland areas such as bush, forest and pastoral land as well as the domestication of a great variety of these indigenous plants and trees for home

consumption and medicinal use in the more densely populated and intensively used mid- and highlands. Southern Ethiopia, particularly Konso, Derashe and Burji special Woredas and parts of SNNPR (Southern Nations, Nationalities & People's Region) may still be considered part of these so-called biodiversity hotspots in Ethiopia.

Konso people, for example, still have and use a well-developed knowledge concerning which wild food plants can best provide a dietary supplement in periods of food shortage. Konso people, well known for their hard labour and sophisticated agricultural system (Lemessa, 1999b), have been stricken by drought since 1996. In this period they have faced repeated significant harvest losses and even complete crop failures. Nevertheless, until June 1999, most Konso people managed to cope with these harsh climatic conditions and survived by increasing their consumption of wild food plants. Damaged, reduced or even lost crop harvests have been partly compensated by the collection of wild foods. Unfortunately, three severe years with only meagre harvests and yet another harvest failure in 1999, was just too much for many people in Konso, an ecologically fragile area, despite the people's incredible efforts to protect and conserve the local environment.

Objectives and Methodology

The reasons to initiate a study on 'wild food' plants, with an emphasis on 'famine food' plants by the United Nations Emergencies Unit for Ethiopia (UN-EUE) have a largely practical and pragmatic basis. The initial idea was to document indigenous knowledge on wild foods, more particularly on 'famine food', to identify and understand better the importance of wild food plants in the survival strategies adopted by rural people in food insecure areas of the country.

Besides the collection of secondary data, of which unfortunately very little exists on wild foods and related subjects concerning Ethiopia, informal guideline interviews were conducted with selected key informants. In the field, interviews and discussions were held with farmers, herders, children and women, bush and farm walks that were undertaken for tracking down specific wild plants. The study team was guided by local agricultural experts from Woreda agricultural offices who identified knowledgeable key informants and also acted as translators. Whenever possible, background information was collected on edible wild plants, vernacular names of the plants were registered, photographs of the plant were taken and a sample of the plants edible components was taken. Sixty different plant specimens were collected, mounted, labelled and submitted to the National Herbarium at Addis Ababa University for identification and taxonomic classification.

Konso Special Woreda, Kindo-Koyisha, Humbo, Damot-Weyde and Kamba Woredas of North Omo Zone and Bako-Gazar and Hamer-Bena Woredas of South Omo Zone in the Southern Nation, Nationalities, Peoples Region (SNNPR) of Ethiopia were selected for the initial field survey in January 2000. These localities figure among the most chronically food insecure areas of Ethiopia, periodically facing food shortages due to their fragile environmental setting. They are located 400 to 700km south of Addis Ababa. In addition, following the initial survey, information on wild food plants has been collected during subsequent field trips in other areas of Ethiopia such as Afar, Hararghe and its southern lowland areas towards Somali Region, North and South Wollo, and Jimma and Illubabor in the Western part of Ethiopia. Furthermore, the Ethiopian Venture Project[13] contributed significantly. Using the same methodology, approximately 40 additional wild food plants were identified and described in three different areas in northern Ethiopia, including Jana Mora Woreda (North Gonder Zone), Ziquala Woreda (Wag Hamra Zone), and Ganta Afesum Woreda (East Tigray Zone).

Field Guide and Web Site

The UN-EUE compiled all the collected information into a field guide that aims to facilitate plant identification and enable field workers to make comparisons across different areas in Ethiopia where people may have different eating habits and knowledge of wild

[13] For further information on the Ethiopian Venture Project, please refer to the following webpage, where all the necessary information on this project can be found: www.ethiopian-venture.org.uk

food plants. The field guide is kept as database at the UN-EUE office in Addis Ababa, is updated regularly and available on the UN-EUE web site[14]. For each plant, in addition to its general physical description, the specific information on consumption, palatability and preparation is central and most important. This is also the part that makes this guide different from other similar field guides.

UN-EUE would like to encourage active contributions such as samples of additional wild food plants for inclusion in the present field guide and it is hoping to obtain feedback from interested parties[15].

One of the difficulties encountered is the confusion some of the vernacular names create because different species may have identical vernacular names. This is because farmers or users of wild food plants use a different classification system or similar species that are prepared, mixed with other foodstuff and consumed in the same way may all be given the same vernacular name.

The field guide is incomplete in many ways. For some of the species only very little information is yet available. Formal identification of some specimens has yet to take place and scientific names of some species are still missing. Furthermore, for some wild food species, especially seasonal herbs that were not in season at the time of the field surveys, only an oral description could be collected from key informants. Many plant species could not be photographed because the specimens found in the field were not representative or simply not available. Some photographs are of poor quality, therefore do not tell much about the plant species, and hence may have to be replaced by more appropriate pictures that may be taken during forthcoming field missions. The build-up of this field guide is an on-going process whereby data and species will continuously be added, improving its content and its scientific value. Despite all the mentioned shortcomings of the present version, we feel the need to share the information we collected with other interested parties to be able to improve and gain more knowledge on the importance of wild food plants and the potential some of them may hide. This potential waits to be discovered and improved so that some wild food plants may become future indigenous staple food crops that may ease food insecurity in some of the most vulnerable areas in Ethiopia.

The field guide is primarily aimed at field workers, researchers, development and environmental specialists involved or interested in food security issues at all levels of intervention, i.e. international, national, regional, local.

GENERAL DESCRIPTION OF WILD FOOD PLANTS

General Description and Classification of Domestible Wild Plants

Wild Foods

The term ‘wild food’, though commonly used, is misleading because it implies the absence of human influence and management. In reality, there is a continuum resulting from the development of co-evolutionary relationships between humans and their environment (Bell, 1995). People have indirectly shaped many of the plants and some have been largely domesticated in home gardens and in the fields together with farmers’ cultivated food and cash crops. Nevertheless, the term ‘wild food’ is used to describe *all plant resources out-*

[17] To access the famine food web site directly: www.telecom.net.et/~undp-eue/famine-food-web

[18] Please contact UN-EUE office in Addis Ababa or contact both authors directly:

Yves Guinand, phone 44-44-11, 44-41-48, 51-17-26, 51-37-25, e-mail yvesguinand@hotmail.com, guinand@unocha.org;

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If you want to contribute directly to the field guide compendium, please refer to the samples for the required information on each species and send, if possible, also two pictures of the species, a close-up and one that is showing the entire species. Contributions can either be sent by e-mail directly to the UN-EUE office; e-mail un-eue@unocha.org, undp-eue@telecom.net.et or handed in or sent to UN-EUE, P.O. Box 60252, Addis Ababa, Ethiopia. Have a look at our webpage: (local) www.telecom.net.et/~undp-eue/ (international) www.sas.upenn.edu/African_Studies/eue_web/

side of agricultural areas that are harvested or collected for the purpose of human consumption in forests, savannah and other bush land areas. Wild foods are incorporated into the normal livelihood strategies of many rural people, be they pastoralists, shifting cultivators, continuous croppers or hunter-gatherers (Bell, 1995). Wild food is usually considered as an addition to farmers' daily food consumption pattern, generally based on their crop harvest, domestic livestock products and food purchases on local markets. Fruits and berries from a wide range of wild growing plants are typically referred to as 'wild food'. Wild fruits and berries add crucial vitamins to the normally vitamin-deficient Ethiopian cereal diet, particularly for children.

Famine Foods

Various case studies in different parts of Ethiopia revealed that typical 'famine foods' consist of a variety of plants of which leafy and tender parts of stalks, pseudo-stems, fruits, berries, seeds, husks and roots, i.e. tubers and corms, are mainly used for consumption. Plants classified as typical 'famine food' plants are normally not consumed due to their limited seasonal availability, local taboos, offensive nature of the plants such as abundance of thorns and tiny spines (mostly not on the edible part of the plant), certain unpleasant characteristics and side-effects such as bad taste, complicated and prolonged preparation, and association with stomach complaints, constipation, diarrhoea and even intoxication. On the other hand, certain 'wild foods' which are liked and therefore collected and consumed at all times when ripe, may also become very important 'famine foods' during periods of food shortage. In certain areas of Southern Ethiopia some potential 'famine foods' are well known as livestock fodder during normal times which will also be consumed by humans at times of severe food shortages.

Proposed Wild Food Plant Categories

Depending on the parts of the plants (fruits, leaves, roots etc.) consumed in certain circumstances (normal time versus periods of severe food shortage) by different consumers (adults, children, women, men), four major categories of 'wild food' plants can be distinguished: (1) typical 'famine food' plants, (2) 'wild food' plants with 'famine food' components, (3) 'wild food' plants attracting additional consumer categories during food shortage periods, and (4) on-farm food crops with 'famine food' components. Each category and some typical representative examples of 'wild food' plants are described below.

Typical Famine Food Plants

From a typical famine food plant, leaves, stalks, inflorescence, roots (tubers and corms and rhizomes) or barks (mainly of *Acacia sp*.) are edible. Many of the root-type famine food plants are drought tolerant and can stay in the soil intact for a long time. Therefore, they can be collected when the need is greatest. Most of the leafy-type famine food plants are locally referred to and classified as 'weeds', sprouting and flourishing after rains. They generally mature within a short period of time (about two weeks). There are two main periods of maximum consumption of the leaves and tender parts of such famine food plants. The first period is while farmers are waiting for the upcoming crop harvest. The second main period is when they run out of food stocks from the previous harvest, and are facing a food shortage. People try, whenever possible, to add famine foods to local staple foods or to mix it with other foodstuff to mask the often offensive nature of the food and to reduce any characteristic and unpleasant side effects. At present approximately 50 wild food plant species are listed and classified as typical famine food plants from an approximate total of 120 listed wild food species.

In Konso Special Woreda, in Southern Ethiopia, *Amorphophallus gallaensis* and *Arisaema species* (*'bagana'* in Konso language*)* and *Caralluma sprengeri ('baqibaqa')* are considered typical famine food plants. *Bagana* is a corm plant of which three varieties are used: the '*normal*' *bagana*, the *litota* (some call it also *'panshala'*) and the *romitta* variety. All are growing in farm fields. The *litota* variety is preferred to the other two because it has a relatively acceptable taste. Compared to normal *bagana* and the *romitta* variety, it can be prepared within a short time, is less perishable, and can be stored for a longer period of time. But all three varieties have to be crushed and dried

prior to further preparation. The dried parts are then ground to powder. Finally the powder is mixed with water and cooked like maize for approximately 30 minutes. The process may take several days of preparation before the other two *bagana* varieties can be consumed.

Baqibaqa is a small stick-like drought tolerant plant "without leaves" of plastic-like constitution, propagating vegetatively by cuttings. In Konso, farmers differentiate three varieties of *baqibaqa* for which they have no specific names. The first variety is of brown colour and reaches up to 25cm in height, the second is green and slightly taller, and the third is grey, short and thick (approx. 10cm). Farmers explained that *baqibaqa* tastes relatively good without unpleasant side effects when boiled and consumed. In Konso it is mostly eaten together with *kurkufa (in Konso language)*, locally prepared sorghum balls. Other examples of typical famine food plants in Konso are *Sterculia africana ('qawureta'* in Konso language*), Dobera glabra ('karsata'* in Konso language*), Portulaca quadrifolia ('marayita'* in Konso language*)* and *Maerua angolensis ('kadhi'* in Konso language*).*

From a *Balanites* species named *'kuze'* in Gamogna, farmers in Kemba Woreda, North Omo explained that its fruits are only eaten during food shortage periods because they need special treatment before consumption; the ripe fruits have to be boiled first, then the skin is removed and the flesh is edible. Furthermore, the skin of the kernel can also be removed; the remaining inner part is then washed with ash, cooked and mixed with salt for consumption. Still after all these processes the food tastes sour and unpleasant.

Opuntia ficus-indica is a cactus with edible reddish fruits when ripe. In Daro Lebu wereda, West Hararghe, particularly in the remote lowlands of Daro Abona, people are usually collecting and consuming available fruits from *O. ficus-indica* that spreads widely all over the lowland areas in the dry season. Children and women collect the ripe fruits with a long wooden stick with a large nail at its end. The fruit is pierced by the nail and torn off the plant. It is then rubbed on the ground to remove the spines. The upper end of the fruit is sliced-off with a knife and the remaining piece sliced open on one side so that the thick skin can be easily removed by hand to eat the inner part. High consumption of *O. ficus-indica* fruits, even though rather pleasant and tasty, causes intestinal problems. *Opuntia* species are spread all over Ethiopia and well known in most parts for their fruits as a 'famine food'. In many parts of Tigray Region, the fruits are even sold on local markets, such as in Mekele town. In Konso people also eat the fruits in times of hardship.

Even though more commonly consumed in Ethiopia's food insecure areas, typical famine food plants are also being consumed by people who face food shortage in other areas of the country such as Jimma Zone of Oromia Region. Weeds like *Sporobolus indicus ('muryi/harataa'* in *Oromiffaa),* a grass weed with tiny seeds like teff grains, *Guizotia scabra ('hadaa'* in *Oromiffaa) and Bidens pachyloma ('chuqii'* in *Oromiffaa),* are considered typical famine food plants and were consumed in 1999 when food shortage occurred in Seqa Choqorsa and Setema Woredas due to a prolonged dry spell (Lemessa, 1999c).

Wild Food Plants With Famine Food Components

Within this category so-called multi-purpose wild food plants are represented. Fruits plus one or more additional food products such as leaves and tender parts of stalks and/or root parts can be used at different times of the year and at different stages of food shortage. At present only three species have been identified that fit into this multi-purpose 'wild food' plant category.

Balanites aegyptiaca ('bedena' in Amharic), a small evergreen tree, about 10 to 20 meters in height, is a typical representative of this category. Its fruits are eaten when ripe by children and by adults during food shortage periods. The new shoots, which are always growing during the dry season, are commonly used as animal forage. But in periods of food shortage people cut the newly growing succulent shoots and leaves and cook them like cabbage. People in drought prone areas of southern Ethiopia also apply these consumption habits to the fruits and young leaves of *Solanum nigrum (black nightshade*), a small annual herb and *Syzygium guineense (waterberry tree)*, a dense, leafy forest tree around 20 meters in height.

Wild Food Plants Attracting Additional Consumer Categories During Food Shortage Periods

The majority of wild food species encountered during the field study in southern Ethiopia could be placed in this category. For most species classified in this category people's consumption behaviour is the same, that is, only the fruits or the berries are eaten or considered edible. Children consume the fruits in normal times, but when food is short adults will collect and consume fruits from wild trees and bushes. From an approximate total of 120 identified and listed wild food species, fruits are exclusively consumed from almost half of them, which are mostly tree and bush species such as a variety of identified *Ficus* and *Grewia* species.

On the other hand, a series of semi-domesticated wild plants such as *Amaranthus* species and some other vegetable-like plants, i.e., *Brassica carinata* as well as wild tubers (*Vigna unguiculata*) have been assigned to this category because they are consumed in normal times but have also been semi-domesticated to serve the purpose of bridging food gaps in times of drought.

On-Farm Crops With Famine food Components

On-farm crops with famine food components are few and are likely to be perennial plants. The famine food components are normally not consumed because it may imply the total destruction of the plant. Farmers consulted in the different study areas mentioned six on-farm crops bearing famine food components: banana *(Musa paradisica)*, false banana *(Ensete ventricosum)*, grass pea (*Lathyrus sativus)*, cotton plants (*Gossypium spp*.), the cabbage tree (*Moringa oleifera*) and sorghum (*Sorghum spp)*.

In Wolayta, North Omo Zone, the corm (root and stem juncture) and fleshy pseudo-stem[16] (false-stem) of the banana plant is consumed when severe food shortages occur. At times of hardship immature enset plants are also harvested and used in a similar way. As the corm and the pseudo-stem are decorticated, the banana and enset plants have to be destroyed. Enset, commonly found in home gardens in parts of Southern and Western Ethiopia, reaches maturity after about eight years depending on the type of clones planted and the local agro-ecology. But many farmers are forced to harvest and destroy the plant before it reaches physiological maturity, which consequently leads not only to the total destruction of the crop but also affects the quality and quantity of the food products obtained. Sometimes, when there is an acute shortage of food, farmers may even consume seedlings and saplings of enset (Shank & Chernet, 1996). In Konso, school children revealed the consumption of unripe boiled papaya (*Carica papaya*) fruits mixed with moringa (*Moringa oleifera*) leaves during the 1999 famine period in the Woreda (DPPC, 1999b).

In southern Ethiopia, cotton as a cash crop is very popular among farmers. Cottonseeds are edible and if available, consumed during periods of food shortage. In Konso, cottonseeds are boiled and eaten mixed with other foodstuffs. The consumption of sorghum husk mixed with other foodstuff such as cereals obtained through humanitarian relief food distributions (personal observations) is also practiced in times of severe food shortage.

In Northern Ethiopia grass pea, also called chickling pea or 'vetch' (*Lathyrus sativus)*, known in Amharic as *guaya*, is known as typical famine food plant. Grass pea has been introduced to the northern highlands as a fodder species for livestock, but humans consume the plant extensively during food shortage periods. Grass pea is a drought tolerant, high yielding, nitrogen-rich, leguminous crop with high-quality protein and carbohydrate. Consumed excessively, grass pea causes irreversible crippling effects in humans, a disease known as *lathyrism* (Tekle-Haimanot, 1994). Livestock on the other hand, rarely show symptoms of poisoning (Raloff, 2000). The consumption of grass pea in the highlands of northern Ethiopia and the continuous increase of cases of human lathyrism has repeatedly been reported (Ahrens, 1997, 1998; Klingele, 1998; Getahun and Haimanot, 1998). This livestock fodder and famine food crop is increasingly consumed in chronic food shortage areas. The disease occurring after excessive consumption affects particularly the poorest and most active population segment. But

[19] The pseudo-stem is "the 'tree trunk' formed by the bases of the leaves of the leaf sheaths adhering to one another in concentric fashion" (Shank & Chernet, 1996: p.2)

poor people in famine stricken areas such as Wollo may not have to fear lathyrism from grass pea anymore. The International Centre for Agricultural Research in the Dry Areas (ICARDA) in Aleppo, Syria, succeeded in breeding virtually toxin free cultivars of *L. sativus*. The research took 15 years until it became possible in the beginning of 2000 to produce strains of *L. sativus* offering the yield, taste, and environmental ruggedness of the original plant (Raloff, 2000).

Local Drought Indicator Plant

Farmers and pastoralists in southern Ethiopia recognize a number of indigenous so-called drought indicator plants. In the lowlands of Konso special Woreda, along the Segen River, *Dobera glabra* (*'karsata'* in Konso language) is one such typical drought indicator. It is a much-branched evergreen shrub or tree of up to 10 meters in height. New shoots always grow during the dry season. If rains are delayed or fail, the tree typically shows an enhanced production of new shoots, fruits and seeds. Local Konso people observed a significant *D. glabra* fruit production increase during the last four years (1996-1999) coinciding with the climatic dry spell. Farmers observed that in normal times, when rains are on time or abundant, *D. glabra* does not produce much fruit and seed. When the tree is blooming abundantly, Konso people fear that a drought may very well be under way and hence, food may become scarce. Besides its drought indicator qualities, *D. glabra* produces edible fruits and the seed is considered a typical 'famine food'.

Low-Land Savannah: The Last Remaining Cradle of Wild Food Plants

The lowland savannah of Ethiopia is among the remaining and most important niche for many kinds of indigenous plant species, notably wild food plants. This is partly because these areas are less impacted by the activities of people, typically sedentary cultivation and permanent settlements. Most of the wild food species identified were collected from the lowland areas. Many, particularly trees and shrubs, are only found there. Nowadays, people collecting and using wild food have to travel ever further from their villages in the midlands and highlands because more and more bush land is being destroyed and turned into arable land for cultivation. Wildfire, deliberate burning - mostly to regenerate pasture grasses and control animal exo-parasites, deforestation and bush clearing are major threats to the biodiversity of this unique ecosystem.

Many useful indigenous plant species are gradually disappearing, being the unfortunate victims of deforestation and the general destruction of land and trees. In southern Ethiopia, particularly in Konso, charcoal production was unknown until 1998. Road construction workers, who use charcoal for cooking, are disseminating the skill of charcoal production. The construction of new roads, such as from Konso to Burji Special Woreda, brings charcoal production to the area. New roads also open new market opportunities and charcoal, being mainly used in urban households, is a welcomed off-farm income opportunity. But charcoal production is, no less than wildfire, an efficient tree killer. In places where charcoal production relies on open bushland and natural forests, indigenous trees are rapidly and irreversibly disappearing.

Mid-Lands: Where Wild Food Plants Grow in Farm Fields

The history of settlement in most parts of Ethiopia tells us that people first populated the highland areas for security and protection and the more favourable climate. The lowlands, on the other hand, were avoided as much as possible mainly due to the threat of malaria. Today, land is in short supply due to the high population density in most highland areas of Ethiopia. High population density has led to environmental degradation and many highland areas have lost their once rich and unique biodiversity. Regarding trees and shrubs, indigenous species have largely been replaced by a few fast growing exotic species, notably eucalyptus. This exotic tree, introduced to Ethiopia at the end of the 19th century, became important for farmers as a cash crop, for construction and as a source of energy, but eucalyptus cannot provide the same wide variety of different products as indigenous species and in addition has negative effects on soil fertility.

On the other hand, declining biodiversity and the dependence on a narrow range of crops for food production, increases vulnerability to food shortage.

Using for example improved and hybrid varieties of maize and sorghum, which have been bred for specific characteristics, minimal variability (as opposed to the landraces) and with higher yield potential, has also increased the vulnerability of some communities to food insecurity as they lack drought, pest and disease tolerance and are poorly adapted for long-term storage, unless chemically treated. These problems are further compounded by the lack of market facilities and the existing infrastructure problems in the country. In Ethiopia, with its extreme local variations in ecological, climatic, soil and farming characteristics, the use of "improved" crops showing minimal genetic variability (uniform crop varieties) does not help much, unless complemented with local crop varieties and landraces. Striking the balance between the two will help to bring the required food security improvement.

The decline in biodiversity as observed in Welo and North Shewa in the northern part of Ethiopia, is a potential threat to food production, as crops become more vulnerable to pest attacks, diseases and dry spells (Guinand, 1999). Where forests and bush lands are cleared for cultivation, the rich indigenous biodiversity is gradually disappearing. Farmers have managed, to a certain extent, to preserve some of the more important indigenous species by either domesticating them on their farm plots, home gardens or by preserving and managing them *in situ.*

In southern Ethiopia, some wild food plants considered as typical famine foods, i.e. *Amorphophallus gallaensis* and *Arisaema species* (*'bagana'* in Konso language*)* and *Caralluma sprengeri ('baqibaqa'),* are purposely cultivated on farm fields to be available and used at times of food shortage. *C. sprengeri* is cultivated on the stone walls forming the terraces in the midlands *(weyna dega)* of Konso Special Woreda. By having chosen this particular niche, *Pachycymbium sp* does not compete with other crops.

Amorphophallus gallaensis and *Arisaema species* are commonly present in farm fields like many other famine food plants, which usually are considered weeds. Therefore, farmers uproot and destroy them during normal cropping seasons. But when rains fail and the crop harvest is endangered, these weeds, the famine food plants, become an important food resource. One of the most common and well-known typical famine food plants in southern Ethiopia is *Portulaca quadrifolia,* which was mentioned in all the surveyed areas as one of the most important species. Unfortunately, it is a noxious weed infesting farmlands and difficult to control and eradicate once established in a field. Even though considered a crucial famine food plant, the species can neither be tolerated nor domesticated on-farm due to its aggressive behaviour.

Most useful indigenous wild food herbs and tree species found on farmers' fields have not been purposely grown and domesticated in the proper sense. Some of them, like *Amaranthus sp.* and *Solanium sp.,* are mostly wild, germinate in home gardens and farmlands, and are usually not given much attention. But they are consumed like any other cultivated crop. These two plants are used and have the potential for becoming useful staple crops and it is unclear why these two plants are not given appropriate care and management.

Farmers know how to make use of indigenous tree species, but they have little knowledge about seed treatment and other propagation methods. Most of the indigenous trees are not planted or raised purposely. But farmers know about the usefulness of certain tree species. So, if it happens that a seedling, a so-called wildling, germinates and grows somewhere on the farm, it will be nurtured and protected.

Sequences of Food Availability: When Wild Food Plants Fill the Food Gap

Wild food plants are able to fill a variety of food gaps. If, for example, the previous crop harvest was not able to provide enough food to last through to the next harvest, wild leafy vegetables, cabbage and tuber-type famine food plants will be consumed to fill the gap after the first rains, when farmers are preparing their fields. These typical famine food plants grow fast after the first rain showers and can be consumed shortly after. Wild tree fruits usually mature only once a year, mostly coinciding with the growth cycle of cereal food crops. Therefore, in a situation where a dry spell exacerbates serious crop losses or even complete harvest failure, wild fruits will help fill the

immediate food gap after a failed harvest. Nevertheless, in most of the areas surveyed it was observed that different wild fruits are available at most times of the year. The first UN-EUE survey took place in January. Usually the last cultivated crops are harvested in November, and yet the fruits of many identified wild food species were ready to be tasted. Others were on the verge of maturity, while some others were not available at all. Contrary to previous assumptions, the study team learned that people have the opportunity to collect wild food almost throughout the year. But in most cases the biomass production from the famine food plants is not bulky enough to cover the required needs. For example, in Konso there are three fruiting periods depending on the tree species. The main fruiting periods for most of the tree species are from May to June and from October to November. But farmers reported that *Balanites aegyptiaca,* and *Balanites rotunda* trees give fruits in December and January.

Economic Value and Marketing of Wild Food Plants

A number of wild food plants are of economic value and are traded in markets in certain areas of Ethiopia. One of the most prominent examples is coffee: in the western part of Ethiopia, in Illubabor and Jimma zones, part of the coffee production is still being harvested from 'wild', non-domesticated coffee trees growing naturally in the forests. Less prominent fruits and seeds from wild food plants are mainly traded on local markets. Whether wild food plant products are traded for cash or are exchanged for other foodstuff or non-food items, remains to be determined. Nevertheless, in Southern Ethiopia, wild food plants are mostly used for home consumption and if traded on the market, they are most likely not traded for money but exchanged for other goods and foodstuff. In Western Ethiopia (Jimma and Illubabor) as well as in remote areas in the Tekeze River lowlands and in the Simien Mountains of North Gonder and Wag Hamra, a considerable variety of wild food plants are offered on local markets. These marketed wild food plants include a couple of teff-like grassy plants and seeds. An example of a traded and exchanged wild food plant is *Opuntia ficus indica,* a cactus plant. Its fruits are traded for cash on markets in Tigray Region during the rainy season. Also, the fruits of *Borassus aethiopum*, African fan palm, are marketed in Afar Region. The fruits and pulp produce oil that has an economic value. The fruits themselves also represent a considerable economic value in the lower Afar Region near Awash town. Local traders are buying the fruits from the Afar and Karayu to sell in the market in Awash town. The leaves, stalks and seeds of *Brassica carinata* are traded on remote markets such as in Jana Mora Woreda in North Gonder. Fruits of *Cordia africana* and *Ziziphus spina-christi* are also offered on markets in Jana Mora Woreda. Further investigation will be necessary to evaluate the economic value of comestible wild food plants in areas where they are being collected and consumed.

Preparation, Consumption and Side Effects: 'Edible' Does Not Always Mean 'Palatable'

Fruits from wild plants are usually consumed raw as they are picked. Leaves and other tender parts of wild plants are prepared like cabbage and other vegetables, i.e., chopped into small pieces and boiled in water. Roots are either eaten raw or cooked. Some wild tubers are first dried and then crushed. Root parts are usually more complicated and need a longer preparation time and process, especially those which are toxic and need special treatment. Kernels, seeds and nuts are also mostly cooked for a fairly long time before consumption. The consumers revealed that, whenever possible, they need to use more salt to mask the distasteful feature of the foodstuff prepared.

Unpleasant side effects such as bad taste, complicated and long preparation, stomach aches, constipation, diarrhoea and even intoxication are mostly observed with typical famine food plants. For example the fruits of *Dobera glabra*, the Konso people's drought indicator plant, are edible and the kernel is considered a typical famine food. It has to be cooked for a long time, i.e., up to 24 hours, and it produces a bad smell. According to farmers, excessive consumption causes stomachaches and other intestinal problems.

In some cases, variation in local consumption for the same species has been observed. For instance, Konso people eat only the fruits of *Balanites* tree species. But in Kamba Woreda of North Omo Zone, the whole

fruit is boiled, the skin removed and the flesh eaten off the kernel. The kernel is then broken and the inner parts eaten. *Piliostigma thonningii* (*'olofo'* in Hamer language*)* trees are another example. In Alduba village (South Omo Zone) the Hamer people collect pods of the tree and eat the fleshy part around the small seeds like biscuits, whereas in Bedessa and Kindo-Koyisha Woredas of Wolayita, the same part of the tree is commonly used as animal forage but not for human consumption. This variation in practices regarding the uses and edibility of parts of the same species may have a lot to do with the frequency of food shortages in a specific area and/or people's way of life. In semi-arid areas, where basic resources such as food are scarce anyway, people may have been under pressure to adapt to the harsh conditions of life and discover a greater variety of edible wild plants and their respective parts. In highly populated areas where intensive cultivation is the norm, biodiversity is considerably reduced and the possibility of finding wild food plants minimised compared to the lowland areas.

SOCIAL IMPLICATIONS OF WILD FOOD CONSUMPTION

Wild Food Consumption: A Source of Shame and Insult

Often wild foods are considered to be a low-status food and its consumption regarded as a source of shame. In normal times only children, youngsters and the poorest families regularly collect and consume wild food. In Kayissa Kebele, South Omo Zone, farmers interviewed stated that all the 10 wild food plant species collected are not consumed by the majority of the population except when there is a serious shortage of food affecting all strata of the population from the poorest to the richest. But for the poorest, collection and consumption of wild food may make up an important portion of their daily dietary intake.

Not all people encountered were willing to provide information about wild food and particularly famine food. Some of the farmers when questioned obviously felt ashamed and maybe offended by outsiders asking questions about such sensitive issues as the consumption of famine food.

Some of the wild food plants have such low value that their names are sometimes used as insults in certain areas. In Jana Mora Woreda, North Gonder, for example wild food plants called *'wozber', 'nechelo'* and *'samma'* are insults when people quarrel. They might call each other *'wozberchari', 'nechelochari'* or *'sammabele'*, whereby a '*chari*' is a person *'who digs with his hands'*, which means that the person is so poor that he is not able to afford an ox or even to rent one to prepare his fields. On the other hand, some of the wild food plants enjoy high esteem among local people. The *Dobera glabra* tree ('*garsa*' in Afargna) is abundantly found in Zone 4 and 5 of Afar Region and can easily be recognised in times of drought because of its deep green colour, which stands out in the otherwise uniform grey-khaki coloured dusty arid landscape. A settlement a short distance from the Mile-Bati road to Zone 4 and 5 is called 'Garsa Gita', which means 'the place where '*garsa'* trees are found'. Afar pastoralists have a proverb saying: 'the one who finds *'garsa'* is lucky and will not suffer'. Finding a *'garsa'* tree in times of drought is a good omen for somebody suffering from hunger, a sign he will survive. On several occasions when interviewing Afar people near water points during an April (dry season) field trip and questioning them about wild food consumption, they immediately mentioned and also presented samples of cooked or fresh fruits of *D. glabra* that they were consuming.

In Wag Hamra Zone there is a wild food herb called '*hamle kulitch'* with large spinach-like edible leaves. There is a saying during food shortage periods: 'If I survive until July and August, I will survive until the next year[17] thanks to '*hamle kulitch"*. The wild food '*hamle kulitch*' gets people through the food shortage period before their crop harvest during the '*meher*' rainy season. *Caralluma sprengeri, 'ango shahay'* (Tigrigna), is one of the few 'famine foods' Tigrignan people use for compliments. To be told 'you are like *'ango'* is to be told you are strong, determined person. Two handfuls of *'ango'* is said to fill you up for the whole day. It is therefore often carried on long journeys.

Local Traditions, Beliefs and Religious Constraints

Unlike other many other African countries and especially many Southeast-Asian and Asian countries in general, orthodox Ethiopian Christians do not consume animals like ducks, pigs, donkeys, horses, snakes, rabbits, rats, cats and dogs. Religion, particularly of the Christian Orthodox Church of Ethiopia, represents a major constraint to the use and consumption of wild plants and animals. For the believers, the consumption of wild plants and animals does not conform to their system of traditional and religious beliefs. This means that the range of food available to people during times of stress is narrowed considerably despite Ethiopia's rich biodiversity. As a matter of fact, wild animals as a research subject were excluded from this study. Therefore, we will not go further into detail concerning wild animals for food.

Ethiopians generally are constrained to the consumption of the commonly cultivated crops and neglect wild plants like *Amaranthus sp.* and *Solanium sp.* that have clearly demonstrated their production potential in pocket areas of the country. These and other similar plants could have been fully domesticated and cultivated like any other food crop. Strong traditions, beliefs and religious taboos still obstruct people's psychological and mental willingness to domesticate and cultivate wild food plants. This is a reality that cannot be denied and has to be confronted if the full potential of the indigenous Ethiopian flora as a source of food is to be effectively exploited.

In the southern part of Ethiopia, where there are many different tribes still living with their indigenous beliefs and traditions, there are fewer religious and external constraints than in other parts of the country. In some of the areas studied the daily diet of most people still comprises an element of wild food, both animals and plants, during certain periods of the year.

Gender and Age-Specific Differences Regarding Collection, Preparation and Consumption of Wild Food Plants

Mostly children collect and consume the fruits of wild plants. Other wild food and famine food plants are collected by children and women and prepared by the latter in all the areas surveyed. Women frequently collect wild food when they are on their way to fetch water, collecting firewood, going to the market and when walking home from their fields.

Able-bodied male members of the community usually migrate for daily labour opportunities elsewhere during periods of food shortage. Women and children are left behind to manage as best they can. Therefore, women and children are the main actors concerning the collection, preparation and consumption of wild food plants. Children forage and climb trees for collection while women do the preparation and the cooking.

Young boys consume more wild foods than older ones in normal times. At times of food shortage, however, all ages and both sexes consume equally. But young boys do not eat wild food simply to satisfy their need for additional sustenance but also because there exists a traditional obligation and social group pressure at a certain age (from the end of childhood to the beginning of teen age) to collect and eat wild fruits, for example, with children of the same age.

GENERAL CONCLUSIONS

Despite Ethiopia's long history of cyclical famines, civil war and ethnic feuding during which many people repeatedly endured hardship and deprivation and were forced to collect and consume wild plants to survive, little is known about these wild plants either within the Ethiopian or within the international agricultural research community. Evidence was uncovered in the course of the field study and from the additional information gathered and from contributions by other interested parties that edible wild plants indeed comprise a major part of the dietary intake of rural people during times of food shortage. Hence, the consumption of wild plants is a necessary part of the strategies adopted by people in order to survive in a harsh and unforgiving environment.

[17] 'Next year' means in Ethiopia mid-September and onwards as according to the Ethiopian Gregorian calendar New Year ('Meskel') is in September.

There is a need to document, describe and publish such information to enable specialised research institutions to carry out specific studies on a variety of issues concerning the prevalence and use of edible wild plants in Ethiopia. For example, little is known either about the nutritional value or possible undesirable side effects such as toxicity of food originating from wild, non-domesticated plants[18]. Therefore, it seems imperative to carry out applied research on the nutritional values of these plants and their potential impact on human health as a result of prolonged consumption. It is still unclear if over time some of the wild food plants have long-term positive or negative effects on the consumer's health.

As initial research on wild food plants reveals, some of the species locally used for consumption at times of food shortage, have the potential to become valuable staple foods and important alternatives to the usual cultivated food crops. National as well as international agricultural and food policy research institutions may become interested and may want to initiate further in-depth research regarding the domestication potential of some of the species used as sources of wild food. Wild plant species that farmers highly value and appreciate when it comes bridging a food gap should be studied in more depth. For some, modern agricultural research may improve their biophysical performance similarly to what has been achieved with common staple crops. Research may very well be undertaken to improve the palatability of wild plants. The study team identified a number of useful indigenous food-producing tree species that farmers could easily domesticate if the proper propagation methods could be acquired and applied, instead of farmers relying on the uncontrolled occurrence of wildlings. It has to be stressed however, that where environmental degradation is accelerating, such as in many highland areas of Ethiopia, germplasm collections of wild food plants should be initiated before potentially valuable traits are lost forever.

[18] Studies on nutritional content of a variety of wild comestible plants are on-going in Southern Sudan and the UN-EUE hopes to obtain this information to be able to compare with the species found in Ethiopia. There may be similarities, and very likely, along the common border areas between Sudan and Ethiopia, the same species are being found in lowland bush areas.

We strongly believe that wild food plants should be considered as a serious issue when developing strategies to fight rural food insecurity and develop integrated development programmes for chronic food insecure areas in Ethiopia as well as in other parts of the world.

Relying to a greater degree on wild food plants during periods of food shortage does not mean that wild food plants are a substitute for cultivated staple food crops. They are rather a supplement. The promotion and propagation of wild food plants, however, may be an alternative to modern and artificial ways of boosting food availability such as using gene-technology, for instance, to increase crop yields and enhance production. The option to improve food production through exploiting the potential of wild food plants is a naturally sustainable, cheap and locally available alternative to resolving at least part of the food shortage problem. At the same time, an emphasis on the development of wild food plants will help enhance and maintain biodiversity. Modern tropical agricultural research tends to rely too much on too few a number of varieties of staple crops which are being improved by highly advanced technologies, going as far as to change the genetic make-up of plants in order to improve their performance. Research is underway to genetically change the composition of rice to enable the production of vitamin A; the absence of this vitamin among rice-consuming populations causes a number of serious diseases. Gene-technology may be one solution, but a very risky and costly one. A possible alternative to addressing the vitamin A problem might be research on indigenous edible wild plants for their vitamin A content. Promising plant species and varieties may then be selected by careful screening and propagation and finally disseminated to farmers.

Ethiopia is endowed with a wide range of agroecological zones and conditions. The initial UN-EUE field study included parts of southern Ethiopia, one among many other potential areas where wild food plants exist and are consumed. Subsequent UN-EUE field missions covered parts of Afar Region, the Hararghe northern and southern lowlands, parts of South and North Wollo as well as parts of Jimma and Illubabor zones in the Southwestern part of the country.

We now know that there is more information available from other parts of Ethiopia that could be recorded.

As the UN-EUE field guide intends to raise awareness among interested parties for further in-depth research, it is hoped that other research, development and humanitarian bodies such as national and international research and development institutions that may be interested in initiating research and development activities regarding wild food and famine food plants, will pick up issues discussed. In this regard the present article may also be taken as a research idea or proposal.

DISCLAIMER

The designations employed and the presentation of material in this document do not imply the expression of any opinion whatsoever of the UN concerning the legal status of any country, territory, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

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DISCUSSION/COMMENTS FROM THE FLOOR

1. It was again noted that IPR is an issue for the information posted on the web. The aim of the Ethiopian project is to reduce the reliance on 'traditional' food relief and interventions. Community rights are acknowledged, but there is a strong sense of urgency to bring IWFPs into the mainstream of food security policy and planning.

2. The issue of terminology also needs to be revisited and it was discussed as to whether foods were stigmatized further by labeling them as 'famine foods'. Although some IWFPs are only used in periods of food shortage, the label itself is not important. What needs to be highlighted is the value of the plants to the communities facing food and nutritional shortages.

3. There is a 15,000 year history of crop domestication in Ethiopia and the issue of external assistance to domestication projects was debated. Although there may be farmers who would want to lead such activities the people in Ethiopia have been disempowered by the relief food activities of international organizations. Food delivery is not planned in consultation with local communities and this distorts markets and the driving forces for local domestication activities. In addition, there is little encouragement from government or external agencies for such activities.

4. The species discussed as a drought indicator — *Dobera glabra* — is found in areas with low water tables. *D.loranthifolia* is then found in areas with higher water tables. If the water table raises the *D.glabra* becomes dormant, reductions in the water table with then stimulate fruiting and flowering. This would account for the indicator signs discussed in the paper.

Domestication of Indigenous Wild Food Plants

Rudy Schippers, NRI

DOMESTICATION

Over the millennia people in Africa managed to domesticate about 125 species of vegetables out of the approximately 850 species that are known to be collected from the wild. Many of these domesticates have become scarce at present but there are some 25 species left that are currently cultivated across the continent and their popularity is on the increase.

Once the list of approximately 120 species of edible plants that are known from south Sudan and southern Ethiopia has been narrowed down to a limited number with a high priority, the next step will be to establish a list of desired properties for each of these priority species.

This "wish list" should be prepared after extensive discussions with representatives from both potential farmers and consumers, in which especially women and elderly people should participate. Such a list could include aspects of taste (bitterness, draw characteristics or sliminess, absence of prickles, spines or nettles, sweet or sour etc.) aspects of ergonomics, aspects of nutritional value or medicinal value and many others. People are usually asked: what do you like about this plant and what do you not like.

The establishment of key selection criteria will then become a tool to evaluate the diversity of germplasm that has been especially collected for this purpose. This selection of germplasm is usually a participatory procedure whereby people who know the relevant species quite well will be asked to select the plants with the most promising features. These features include yield potential, size, quantity and taste of fruits or other relevant plant part such as stems, roots, leaves, flower buds, etc. Features could also include the potential for preservation or its use in a mixture with other plant products.

Ideally, seeds should be collected from at least 10 different plants belonging to the same species, coming from localities with diverse ecological conditions. These seeds should then be sown in separate lines, each representing a single accession. The more diversified the accessions are, the easier to make a choice during the next round when a selection will need to be made about the most promising line. The non-selected plants should be maintained because they could well contain elements that are desirable and these could be used in follow-up activities.

From each species one should select a limited number of different lines and the seeds of those should be tested for their performance, both in a central unit and with individual people, to be compared with treatments "on-station" and "on-farm". The best of these should then be purified and multiplied so that their seeds could be made available to the community.

Such seeds could be sown near the homestead and the crop could be harvested for consumption by the household. People should however have to ensure that the plant will not be harvested altogether in order to produce enough seeds for the following season. In traditional agriculture such plants will disperse their seeds naturally and the crop will not be weeded out like most wild species that are considered as weeds. Instead, such new crops will establish themselves and spread around the house and the village. If successful, such new crops may well be taken along whenever a member of the community moves from the village, thereby spreading the newly selected crop over a wider area.

This participatory approach of understanding selection criteria, evaluation of local germplasm and development of household cropping systems should enhance food security through greater use of local knowledge and resources.

Indigenous Vegetable Species in Tanzania

Damas Marandu, HORTI Tengeru

There are more than 11 species of indigenous vegetables in Tanzania that are currently being harvested commercially (if not fully domesticated). These include: *Amaranthus*; African nightshade; Brassica species (*B. carinata*); cowpeas; garden eggplant (*Solanum aethiopican*); spider plant; *Corchorus* species; *Galinsoga paruiflora; Bidens pilosa; Commelina bengalensis;* and bitter lettuce (*Launca cornata*).

In the past cultivation of indigenous vegetables was restricted to backyard gardens and most collection for food was from the wild (with the possible exception of *Amaranthus* and *S. aethopican*). The collection was done by women and children and indigenous vegetables were regarded as food for the poor. The commercial value of these foods was negligible.

However, over the past five years there have been big changes in Tanzania. Production has increased dramatically, particularly with respect to *Amaranthus*, African nightshade, cowpeas (for leaves) and garden eggplant. The increase in production has mainly been attribute to a sharp increase in demand, particularly in the urban areas (Dar, Arusha, Dodoma). The reasons for the increase in demand were:

- Affordability — as the economy in Tanzania went through a bad period, IWFPs became more competitive as they require few, if any, inputs.
- Increased nutritional education — an increased emphasis in the primary school syllabus; increased general knowledge on value of balanced diets; more information on the higher nutritional values of some traditional foods as compared to exotics, such as cabbage.
- Lower levels of pesticide and input residue — intensification of production of a number of exotics has been accompanied but an increase in chemical inputs in Tanzania. There is a general concern among Tanzanians about these chemical residue levels.

This increase in production has highlighted a number of issues. First, there are increased gender conflicts as men move into a trade traditionally dominated by women. Second, there is not enough knowledge about preservation methods for these crops. Third, there has been a lack of research into techniques to improve the cultivation of these crops (including spacing, input requirements, harvesting regimes) and agronomic packages are required to help farmers produce IWFPs more economically). Finally, the lack of germplasm is a serious constraint to increases in production and increases in the genetic base of the semi-domesticated IWFPs.

Informal Discussion on the Role of Indigenous Wild Foods in Somalia

Mahdi Kayad and Suleiman Mohamed,
Food Security Assessment Unit-Somalia (FAO)

At present there is scare information on the indigenous wild food resources of Somalia and the extent of their use. Some data can be found in the 1988 Ministry of Agriculture/FAO report and the Food Security Assessment Unit-Somalia records (although this is not systematically classified). There are no current, on-going studies. It is clear, however, that there are a large number of IWFPs in use in Somalia and that the people in Somalia also draw on the wild animal resources as a source of food.

The main recorded wild foods are:

Vernacular name	Scientific name
Fruits and Seeds	
gob	*Ziziphus mauritiana*
Hohob	*Grewia pennicilhta*
Bawfw	*Ficus sycamorus*
Leaves and Vegetables	
rasow	*Amaranthus* sp.
kable	*Launaea cornuta*
Carmo	C*issus rotundifolia*
Grains and Legumes	
ye'eid (gud)	*Cordeauxia edulis*

By region, wild foods can be broken down thus:

Northern regions
Mareer — *Cordia sinensis*
Gob
Liko — *Hydnora abyssinia*
Garad — *Dobra glabra*
Moroh — *Leptadenia hastate*
Jaleed — *Classica italica*
Kullan — *Balanities aegyptiaca*
Central regions
Ye'eib — *Cordeauxia edulis*
Go'oso — *Cyperus esculentus*
Hohob
Southern regions
Kablo — *Launeaea cornuta*
Raason — *Amaranthus caudatus*
Southern regions, cont.
Liko
Mareer
Barde — *Ficus sycamorus*
Hohob
Kullan

Normally IWFPs are collected and eaten by herders (boys, girls, men, women) who may bring some home to be used as snacks. It is estimated that they form 0–10% of diets cross the country. Data suggest that poor households consume more and that in hard times consumption increases and may rise to 10–20%.

The low percentages of consumption may be explained by:

1. The pastural nature of the community
2. The stigma attached to wild foods (especially wild meat) — poor man's food
3. The difficulty of collecting such foods in substantial quantities (to be significant as food value)

It is thought that non-food bush products play a very important role in people's livelihoods as these are sold in the markets.

DISCUSSION/COMMENTS FROM THE FLOOR

1. As in southern Sudan, IWFPs are used as an indicator of the food security situation. Monitors use a questionnaire to track whether people are eating more than usual or less than usual levels of wild foods as a means of tracking the food security situation. However, at present there is not the nutritional data to make full use of the knowledge that is being collected on wild foods.

Non-Timber Forest Products in Central Africa: Issues of Conservation and Cultivation

Laurie Clark, Consultant in Non-Timber Forest Products

The Central African region contains the second largest contiguous tropical dense forest in the world (BSP 1993), and the largest on the continent of Africa. The forest is home to over 30 million people most of whom rely on the forest to restore the fertility of their farmlands, and as a source of food, medicines, fuel, and construction materials.

The USAID-funded Central African Regional Program for the Environment (CARPE) is a multi-partner project designed and implemented by US-based government and non-governmental organizations, all of which have experience in the Central African region. Through these partners, CARPE has engaged local NGOs, individuals and government agencies in activities to evaluate threats to forest integrity and to identify opportunities for minimizing resource degradation while promoting human livelihood security.

CARPE's core philosophy is to facilitate the meaningful involvement of African partners and to ensure that African decision makers have access to, and the capacity to use, information critical to rational forest resource management.

The expanded knowledge base and enhanced individual and institutional capacity that result from the implementation of CARPE will serve as the essential foundation for a longer term (15–20 year) effort to sustainably manage forest resources, thus conserving the region's biodiversity and averting potentially negative changes in regional and global climate. Activities are focused on Cameroon, Central African Republic, the Republic of Congo, the Democratic Republic of Congo, Equatorial Guinea, and Gabon.

In the first phase of CARPE (1995-2000), the United States Department of Agriculture Forest Service (Forest Service) served as team leader for the sub-component dealing with non-timber forest products (NTFP). The Forest Service sought to determine the possible contribution of the NTFP sector to achieving overall CARPE goals. The basic question posed by the Forest Service was summed as "Can the development of the NTFP sector contribute to the conservation of biodiversity and the reduction in rates of deforestation in the Congo Basin?"

After several years work with CARPE, the answer to this initial question can be summarized as "the management of NTFP is one of many tools available to forest land managers." The question now posed to the NTFP community is "Should NTFP be considered primarily as an avenue for forest conservation or as a source of supplementary income and insurance for rural and urban families?"

WHAT ARE NON-TIMBER FOREST PRODUCTS?

Non-timber forest products are materials derived from forests, excluding timber. NTFPs include bark, roots, tubers, corms, leaves, flowers, seeds, fruits, sap, resins, honey, fungi, and animal products. NTFPs are collected from the forest or fields. They are used for food and medicine, and as a source of income. NTFPs are consumed in both rural and urban homes, and are traded in local, regional, and international markets.

NTFPs provide small but significant sources of income, particularly for women and for families lacking access to markets. School fees, festivals and other customary rituals, and other extra expenses are often funded through the sale of NTFPs.

NTFPs provide food during periods when agricultural crops fail or are scarce. The forest serves as a security backup to agriculture and cash economies.

Many NTFPs are not marketed, and yet play a vital role in livelihoods. Many of the spices used in traditional cooking are not interesting from a market development perspective — their demand is constant — yet play important social and dietary roles. Use of wild herbs and perennials in traditional medicine provides around 80% of their primary medical care.

MARKET VALUES OF NTFPS

CARPE supported field-testing of a NTFP valuation model in the South West and North West provinces of Cameroon and estimated the value of NTFP production and marketing at over US$19 million in 1999, and contributed 2.8% to the regional economy. In contrast, timber, in this predominantly logged-over area, contributed 5%, and agricultural crops 27% (van Dorp et al, 1999).

Though harvested primarily by rural people, urban dwellers and the African Diaspora in Europe and North America drive market demand for NTFPs. In urban markets *Gnetum africanum* leaves, called eru in Cameroon, sell for US$ 0.8/kg which is less than the price of dried cassava and fresh plantains, and equivalent to the price of a cultivated alternative called bitter leaf (*Vernonia amygdalina* – ndole). Although African Diaspora is willing to pay US$ 50/kg for eru, the volume of trade is tiny relative to that supplying the national markets.

Cross-border trade is significant, with Cameroon serving as a "bread basket" for Nigeria, Equatorial Guinea, Gabon and the Central African Republic. Different cultural practices (Cameroon has more of an agrarian history in many of its ethnic groups), as well as political issues (Equatorial Guinea experienced internal strife from independence) have essentially prevented a generation of people from learning about the traditional ways, and many young to middle aged adults are simply not aware of what products grow in their own forests. Gabon neither had a particularly agrarian culture, nor has it pursued agricultural development with oil and timber revenues providing immense national wealth, for example.

Pharmaceutical uses of NTFPs generate the most significant revenues. Extracts from the bark of the *Pausinystalia johimbe* (yohimbe) tree are consumed locally as a 'cure' for many ailments, and is sold in North America and Europe as an aphrodisiac, and as a stimulant in soft drinks. The total value of yohimbe bark exports from Cameroon was US $600,000 in 1998 and is growing each year.

Similarly the bark of *Prunus africana* (pygeum) is used to extract a chemical cocktail used for the treatment of benign prostate hyperplasia in Europe and North America and was worth US $700,000 to Cameroon, and US $200 million to the pharmaceutical companies in 1999.

Root bark extracts of *Tabernanthe iboga* (iboga) are used in the Bwiti secret society from southern Cameroon through Gabon, Congo Brazzaville, DRC, and Angola. Used in initiation rites, they put the initiate into a drugged stupor where they can remain for days. During this period, they are said to be in communication with their ancestors, and often emerge from the experience with significant life changes. Drug addicts from the West have found using iboga in drug addiction to result in a complete halt to the addiction, with long-term success. Not legal in the North America or most of Europe, it is nevertheless under study and shows great promise for curing serious drug addiction.

NTFPs prized for their leaves, roots or bark are particularly prone to unsustainable use; harvesting either damages or kills the parent plant. Worse, for both pygeum and yohimbe current "sustainable" harvesting practices that partially strip bark from live trees exposes them to stem-boring insects that can result in 50–90% post-harvest tree mortality. Cameroon can supply approximately 200 tons of *Prunus africana* bark sustainably. Yet, over 3,500 tons were harvested and exported in 1999.

SUSTAINABLE USE OF NTFPS

Though NTFPs have been used for millennia, human population in Central Africa is higher now than it ever has been in history, and is likely to double over the next 20 years. In addition, development in the form of roads and other infrastructure open forests to large-scale exploitation, first for timber, then for valuable NTFPs such as *Pausinystalia johimbe*, rattans, and *Gnetum* (eru). People move in and begin to farm, which affects the forest structure — benefiting some NTFPs and not others. The combination of increased populations and increased forest use intensity suggests that wild harvest of NTFPs alone will not be sustainable.

Many of the NTFP species are harvested for their fruit or leaves; in theory sustainable, in practice if not managed, insufficient seedlings survive to maturity to sustain the population. As with any wild plant or animal, if demand and harvesting exceeds annual production the resource will progressively be depleted and become locally extinct.

Though it is natural to want to select the most promising NTFPs for market development, adding-value to NTFPs should coincide with efforts to minimize forest degradation, and ensure equitable access. Studies show that as NTFPs increase in value there is a trend toward over-harvesting of wild resources, increased on-farm production, and exclusion of resource users by resource managers.

Of the 20 most economically valuable NTFPs in Central Africa, 11 are unsustainably harvested and 12 are now cultivated. This trend suggests that few if any commercially valuable NTFPs can be harvested sustainably from the wild, given present resource access and ownership laws.

EXAMPLES OF CONSERVATION INITIATIVES FOR NTFP SPECIES

Domestication and Ex-Situ Conservation Programs (ICRAF, Limbe Botanic Garden)

Domestication and ex-situ conservation programs have been undertaken by ICRAF (International Center for Research in Agroforestry) and the Conservation Through Cultivation Programme at the Limbe Botanic Garden in Cameroon. Both have surveyed local farmers to identify the preferred NTFP species, which are usually the most valuable economically as well. These species have then been ranked, and work begun to establish gene banks, collect seed and propagative materials from desirable individuals, and carry out propagation trials to establish effective and appropriate methods of growing the crops.

The Limbe Botanic Garden has made considerable progress with its program addressing *Gnetum*. It is not difficult to grow from cuttings, or to incorporate into existing agroforestry cropping systems. One example of ICRAF's work is to shorten the time to fruiting for *Irvingia* trees. Normally, that would take 15–20 years. Using the propagative technique of "marcotting", which involves girdling a mature branch, wrapping the girdled area in a moist growing medium that encourages the development of roots, and then that branch is planted. The resulting "tree" begins to bear fruit as early as 5 years later.

Efforts to domesticate and bring into agricultural systems different NTFP such as *Gnetum* and *Irvingia* show promise. In fact, *Irvingia* and another tree, *Dacryodes edulis*, or bush plum, valued for its tart fruit and in-season forms a principal part of the diet, are under de-facto cultivation in that they are planted around compounds and in fields, and when clearing the forest for farms, the farmers tend to leave the wild trees standing.

Domestication effort s will definitely assist in the conservation of economically important NTFP species. However, the process is expensive, and not all species can be domesticated. Further, it is not clear that domestication in any way reduces the level of wild harvest within the forest. Data on that should be forthcoming in the next few years.

Community Forest Establishment and Management with Local Control

In the mid-1990s, Cameroon introduced substantial forest code reform. Among the new legislation was the provision for the establishment of Community Forests. These forests would be allocated to communities following the assessment of the forest resource, development of technically sound forest management plans, and acceptance of the plans by the government. The Ministry of Environment and Forests, MINEF representatives would then assist the communities to manage and benefit from their community forests. One of the primary sectors that communities seek to capture in developing community forests is that of the NTFP resource base. Similar forest code reform has already taken place in Congo (Brazzaville) and is underway in Gabon.

Conflicts between statutory law directing the use of forest products, and that of the various customary laws, adds a layer of interest. In addition, traditional or customary natural resource management systems give different results. An example of this is the case of *Massularia acuminata* in two communities: one in Nigeria and one in Cameroon. The wood of this shrub is used as a chewstick for brushing teeth, and is a principal item of trade. In the Cameroon community, strangers, usually Nigerian, come and pay a fee to the chief to access the chewstick resource, and their off-take is not charged. In Nigeria, outsiders are charged to access the resource — and are also charged for the quantity taken out. The Nigerian community is able to accrue more benefits from the exchange, and also maintains greater control over the resource (Malleson, 1999).

Establishment of Conservation Zones within National Forest Code

The Mount Cameroon Project in Cameroon exemplifies efforts at participatory biodiversity conservation. Mount Cameroon has one of the highest rates of biodiversity anywhere on earth, and is also an area of high endemism. Within the Mount Cameroon Region, is Mount Etindé.

Through many years of effort, the Mount Cameroon Project, together with local stakeholders, traditional chiefs, and influential local people, as well as the different government institutions, have worked to develop rational, functional management systems for the natural resources of Mount Cameroon. Mount Etindé is one of the few undeveloped areas on the mountain. It also provides a globally rare strip of relatively undisturbed native vegetation extending from the sea to sub-alpine conditions 4,000 meters above at the summit of Mount Cameroon.

Currently, the different players in the region are working to establish the Mount Etindé Forest Reserve within national forest code. The Reserve will have a Community Forest built into it, giving local people incentive to manage and protect the reserve for themselves. NTFP, including bush meat and eco-tourism, are some of the important values this forest possesses.

CONCLUSIONS

- Non-timber forest products from the humid forests of Central Africa play an important role in the livelihoods of African households, providing a source of food, medicine, spices, services and income.
- For poor families, NTFPs are an essential safety net, whereas wealthier households value them as substitutable commodities such as preferred meat, spices, and native cuisine.

- As NTFPs increase in value there is a trend toward over-harvesting of wild resources, on-farm production, and exclusion of resource users by resource managers. Adding-value to NTFPs should coincide with efforts to minimize forest degradation, and ensure equitable access.
- Formalized NTFP-access rights, and those of land tenure, will be key in asserting the first steps towards actual forest management.
- For a time, NTFPs were seen as a possible "magic bullet" to solve deforestation issues. Experience has tempered that belief whilst reinforcing the fact that NTFPs are an important, ubiquitous, and culturally integral part of rural and urban lives in Africa, and must continue to be considered in forest management decisions.

The work presented here was conducted under and funded by the CARPE project. Laurie Clark would like to acknowledge CARPE and the organizations working with the CARPE project. The views presented are the Ms Clark's own and do not represent the official position of USAID or United States Department of Agriculture Forest Service.

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Session 4

Chair: Monica Opole

Traditional Food Plants of Bulamogi County, Kamuli District (Uganda): Preliminary Results

John Tabuti, Department of Botany, Makerere University

The results presented in this lecture are those that have been gathered in a project that was initiated to document all data pertaining to traditional food plants. This research, which is part of a wider ethnobotanical study in the area of Bulamogi County, Kamuli district of Uganda, began six months ago (2000). Bulamogi County is a wooded grassland savanna of mainly non-uniform small-scale farmland. The importance of traditional food plants cannot be over-emphasized. According to FAO (1988), among other things, they play an important role in food security, diversify the diet, are adapted to the environment, etc.

Participatory methods were employed to carry out this research. These included semi-structured interviews (SSI), guided interviews, and direct observations. These methods are going to be supplemented in the remaining part of the fieldwork with focus group discussions and transect walks.

Results gathered so far indicate that in Bulamogi County 98 different plant species that grow in the area are used as food. Of these 98, only 40 plant species appear regularly in the diet. Therefore about 60% of the plants have been neglected. The community explained that the abandoned plant species were neglected because they possessed one or more of the following negative attributes: poor taste, low yield, long growth periods, no cash value, or required much effort to harvest. Another reason that has had much influence on the choice of plants to eat is change in lifestyle. Many of the different plant foods that were hitherto enjoyed as snack foods, were mainly used by herders or hunters. With the decrease in bush/brush fallow or forests, the practices of herding and hunting are steadily dying away. Another reason again is that with people actively growing modern cultivated food plants, hunger periods are infrequent and they no longer need to gather wild food plants for subsistence. The people are also confident in their ability to purchase food to overcome lean periods.

As mentioned earlier more plants have been abandoned than are eaten. These abandoned food plants are those that grow wild. Of the 40 most preferred species only 10 grow wild. With the majority of the plants underutilized, there is a danger that these plants are threatened with extinction to some degree. When a plant is conceived to be useless, it attains the status of a weed and accordingly becomes easier to destroy. Of particular note is *Sclerocarya birrea*, this plant is not considered important and is therefore cut down to make charcoal.

Reliance on cultivated food plants, which have undergone much selection to improve their genome, leads loss in genetic diversity, which threatens food security. Food security is threatened in other ways. From data gathered it has become clear that 14 plants are depended on in times of food scarcity. Seven of which are cultivated and 7 are gathered from the wild. Of the wild ones, *Dactyloctenium aegyptium* and *Canna* spp. are neglected and are viewed as weeds and therefore routinely destroyed. However, the *Dioscorea odoratissima Pax* and *Dioscorea schimperana Kunth* are threatened with habitat destruction. It has again been mentioned that the people of Bulamogi believe that they can pass through lean periods by buying food. But as demonstrated by Luka Biong Deng in Southern Sudan (see earlier sessions in the workshop),

when the people were hit by disasters of war and famine, those communities that had retained their plant gathering local knowledge were better able to overcome the famine than the communities that had abandoned wild food gathering and were used to purchasing their food.

Generally the people of Bulamogi depend on cultivated food plants for their nutrition needs. They are depending on a narrow food base. This puts them at risk in as far as food security is concerned while threatening biodiversity at the same time. It might be that loss of some of the plants through extinction might cause some cultural ceremonies to disappear. One such ceremony for example is the ceremony of cleansing twins, in which several plant species are used.

RECOMMENDATIONS

The major findings from this study are that the food security and biodiversity of Bulamogi are threatened. This is because the people are neglecting some traditional food plants due to their inferior qualities relative to cultivated plants. The logical way forward is to improve the quality of some of the plant species that will be chosen by the communities. This will raise their status and thus make the people adopt them; this would be followed by domestication exercises. There exists some ignorance on the part of the people about the nutrition quality and economic potential of some of these plants. One such plant over which people are ignorant is *Sclerocarya birrea*. It is therefore important that awareness campaigns are carried out to popularize these plants with potential.

DISCUSSION/COMMENTS FROM THE FLOOR

1. Marcotting can be used to shorten the period to fruiting and may be applicable for some Uganda IWFPs.

2. IDRC is supporting a project on the indigenous plants of Uganda. This project is trying to do a similar study to that done in south Sudan and may have important linkages with the work presented here.

3. There is a subjective impression that in areas with frequent food shortage people use more plant parts than in areas that do not experience such regular shortages. This is an idea that could be explored further in the ongoing research.

Nutritional and Medicinal Importance of Indigenous Food Plants

Christine S. Kabuye and Grace W. Ngugi,
National Museums of Kenya

INTRODUCTION

For people outside rural areas, indigenous food plants (or sometimes so-called wild foods) are usually considered obscure, unpalatable, only eaten by the poor or eaten during times of famine. Moreover, the people who eat these foods do not usually mention them in nutritional surveys. In fact early anthropologists were surprised that some communities did not show symptoms that would have been apparent from lack of certain foods in their diet. Fruits and nuts eaten as snacks during herding or fruits and tubers used to quench hunger and thirst on the way were not usually revealed for total daily food intake. Another factor could be that compared to what was accepted elsewhere as food, these foods were inferior and thus not worth mentioning as part of their diet.

But, the use of these foods, which has evolved over the decades, has served to provide food and maintain general health among populations. In fact many of the food plants are used for both nutrition and medicine: to satisfy the needs of an active individual and to provide elements which act to prevent ill-health and have healing properties.

It must be mentioned that in most traditional societies, there is usually no clear demarcation between what is taken for food and what is taken for medicinal purposes as the two generally overlap. Thus, the nutritional and medicinal importance of indigenous food plants can be considered in the light of maintaining good health and preventing ill health or healing.

This presentation briefly looks at the bio-medical importance of indigenous food plants, addressing both the nutritional and medicinal aspects of the food consumed.

HEALTH NEEDS

While balanced diets are advocated, there are particular nutritional requirements for different categories of the population that are usually emphasized. This is because of particular needs at different stages of development or categories of people with particular needs. For example:

1. Children have different requirements from adults. It is not surprising that children eat more wild fruits, nuts and tubers than adults. From these foods they get energy, gain minerals and vitamins, which they need for growth.

2. Expectant and nursing mothers require a good supply of minerals for the babies and for themselves to replenish what is being used. Iron and folic acid are often prescribed for these mothers in conventional medicine. Traditional foods given to them have been found to contain iron and folic acid. The hyacinth bean, *Lablab purpureus*, spider herb, *Cleome gynandra*, and a few others are often mandatory for such mothers and have a high content of the required micronutrients. In conventional medicine, the mothers are advised to eat well in order to produce enough milk for the baby, while in traditional health systems, there is a provision for milk production as mothers take particular foods, e.g., finger millet porridge, hyacinth bean and roots of *Clutia abyssinica*.

3. The elderly and the sick more often take tonics and soups made from various plants. Among these is the famous *Strychnos henningsii* (muteta) in central Kenya whose root and stem bark is boiled in soup for joint and general pains. Even those in good health use this for general strength and well

being. Some of the food plants in this category are preferred for their medicinal applications.

4. The pastoral communities, whose main diet consists of meat, milk and blood, use various barks and roots in soup, which are believed to reduce cholesterol. There are thus no incidents of coronary heart disease among the Maasai, for instance.

FOODS CONSUMED FOR NUTRITIONAL AND MEDICINAL APPLICATIONS

Following are some examples of the indigenous or traditional food plants with medicinal properties.

Grains

Finger millet, *Eleucine coracana*, is an indigenous cereal that is widely cultivated in East Africa with 72 % carbohydrate (a high energy source), 6–11% protein, 0.33% calcium and a reasonable content of phosphorus, iron and a good content of methionine, an essential amino acid. The latter, not found in maize, is good for preventing and treating kwashiorkor, and the millet is highly recommended as a weaning food for children. It is also good for expectant mothers, while the porridge from fermented grain is recommended for nursing mothers to increase milk production, and is easily digestible to the elderly.

Legumes

Hyacinth bean, *Lablab purpureus*, is a traditional legume whose pods and leaves are used as a vegetable, but the importance being more on the seeds. These have about 24.9% protein, 60.1% carbohydrates and rich in iron, and thus are highly recommended for expectant and nursing mothers. They are also given to increase milk production.

Vegetables

a. Spider herb, *Cleome gynandra*, is a leafy vegetable rich in protein (about 35.8%), vitamin A (good for eyesight and cancer prevention), vitamin C and minerals, calcium and iron. Milk is added to the vegetable to reduce the bitter taste especially for children for whom it is recommended for the treatment of marasmus. The vegetable is also recommended for pregnant and nursing mothers due to its content of calcium and iron. It is also given to boys after circumcision. An infusion of the leaves is used to treat anemia. A decoction of the boiled leaves is taken to facilitate childbirth, treat stomach ache and relieve constipation.

b. Blacknightshade, *Solanum nigrum*, is a leafy vegetable with protein at 29.3% and rich in Vitamin A and C and minerals. Like *C. gynandra*, the vegetable with added milk is given to children to prevent marasmus and kwashiorkor. Boiled with milk, it is also given to expectant and nursing mothers to boost health and help in recuperation after delivery. The vegetable is also given to old people to prevent muscular and joint pains while increasing strength in the weak. In Uganda, it is said to be good in the treatment of hypertension and fever.

c. *Vernonia amygdalina*, known as bitter leaf is a very important leafy vegetable in West Africa. It is also of limited use as a vegetable in western Kenya and Uganda where an infusion of the boiled leaves is drunk to treat malaria.

Fruits

a. Baobab, *Adansonia digitata*. The fruit pulp is rich in vitamin C and B_2 and minerals and is used in various ways. It can be eaten whole or made into a drink. The juice is drunk in the treatment of fever. The pulp is also beaten with milk or water and added to porridge, which is especially good for children. The seeds, rich in fat, are roasted as groundnuts. The leaves and seedlings are used as a vegetable and are rich in vitamins.

b. *Tamarindus indica*. The sweet-sour pulp in the long pods is rich in vitamin C and minerals. Widely used in drinks and for flavouring foods, it is often used as a laxative.

c. Wild plum, *Ximenia americana*. The edible fruit pulp is said to be good in the treatment of tonsillitis and mouth sores.

Tubers

a. *Ipomoea longituba*. Maasai eat the tubers fresh for hunger and to quench thirst while herding cattle. They have been found to have a high content of calcium, 599 mg/100 g edible portion, and potassium, both required for strong bones important for growing children.

b. *Nymphaea nouchalii*. The rhizomes are eaten fresh, boiled or roasted and can be mashed with other foods. The chopped rhizomes and flowers are mixed with honey and chewed as a remedy for kidney problems by the Digo of coastal Kenya.

Tonics, Teas and Soups

a. *Acacia tortilis*. The bark of this tree is boiled and the infusion taken for diarrhoea and stomach ache. Pods are regularly eaten in Maasai land.

b. *Carissa edulis*. The tree has edible fruits, which are rich in vitamin C and liked by children and adults alike. A number of communities use the root in soup to strengthen bones and for general fitness. Incidentally, a decoction of the root is used in the treatment of malaria in children.

c. *Salvadora persica*. A common shrub in semi-arid and coastal areas, used as a chewing stick for cleaning teeth but also effective in healing bleeding and sore gums. The root is used in different ways:

- An infusion is taken by nursing mothers to increase milk production,
- The Maasai add a decoction as a tonic to a child's milk,
- It is boiled in soup for health and strong bones and for curing fever and colds by Pokot and Maasai,
- Dried bark is boiled with tea and taken as a health drink by the Maasai, and
- The small fruits of the shrub are edible and can be dried and kept for long periods.

d. *Ximenia americana*. The Maasai use the dried root bark in tea for good health, while the pounded root extract is used for treating diarrhoea in children.

e. *Zanthoxylum chalybeum*. Leaves and bark of this tree are used for flavouring tea, which is taken for chest pains, asthma and tuberculosis. The dry fruits are also used for flavouring tea while roots are used for flavouring soup. This provides essential oils.

f. *Euclea schimperi*. The Maasai add bark of this tree to a child's milk as a tonic. Also, the bark is mixed with the bark of *Rhamnus prinoides* and added to soup as an appetizer.

Others

Mushrooms. Edible mushrooms are rich in proteins, calcium, phosphorus, sodium and potassium and vitamin B complex with folic acid. The presence of this is useful for increasing blood and mushrooms have many other medicinal applications, notably, they are being used for hepatitis and HIV treatment.

GENERAL COMMENTS

To realize full benefit from the nutritional and medicinal values of indigenous food plants, the perceptions of local people about the food plants including preparation methods need to be understood. What people know about these plants and how they can fully be exploited locally needs to be addressed instead of focusing on the food component only and ignoring the medicinal aspect. It is even possible that the medicinal application(s) of a food plant may be more important than the food application. Since it has been said that 80% of rural populations depend on local medicines, it would be a pity to neglect the medicinal applications.

Other works have confirmed the lack of demarcation between nutritional and some medicinal usage. The fact that nutritional functions in food overlaps the medicinal functions has been shown in the last ten to twenty years by workers like Etkin, working on medicine and diet of the Hausa people of Nigeria, and

Johns working on aspects of diet of the Maasai of Kenya.

Etkin and Ross in their paper on 'Malaria, Medicine and Meals' went on to point out how the consumption of more vegetables and less grains in diet helped the Hausa people reduce malaria infection at the highest time of risk. It is thought that the simultaneous increase in oxidants from vegetables help destroy malaria parasites, and the decrease in vitamin A from the grains, which as an antioxidant, would have encouraged the survival of the malaria parasites. The regular use of bitter leaf, *Vernonia amygdalina* as a vegetable may do the same, as the leaf is also used to treat malaria in Uganda. More research and public awareness are needed to get maximum benefit from such plants.

CONCLUSION

When local people mention food uses of plants, they sometimes refer to other uses that are of medicinal importance. The indigenous or local knowledge supporting such information is usually deep rooted in cultures, having gone through long periods of tending, semi-domestication and domestication in some cases, with some introduction from elsewhere but adopted into traditional food and health systems.

Generally, traditional knowledge is based on time-tested applications, and is therefore the best starting point for research and development.

DISCUSSION/COMMENTS FROM THE FLOOR

1. IPR is a particular problem in respect to the data gathered on the medicinal uses of IWFPs. This is being considered in the policy process underway in Kenya at present, which is expected to give guidelines on how the information collected to date will be made available to the wider public.

Session 5: 25 January

Chair: Brian D'Silva

Indigenous Wild Food Plants: Their Future in Kenya

Patrick Maundu, Kenya Resource Centre for Indigenous Knowledge

One of the first steps in the study of indigenous wild food plants is to understand which species are being discussed, their characteristics and their values other than food. To succeed in domesticating these species this information forms a vital part of the chain. As access to exotic species can be limited by pest and disease outbreaks, it is important that IWFPs are included in the food security strategies and food policies of countries in the region. The cultural value given to these foods is also a key to their continuance in the environment.

During the domestication process, it is also important to consider the target groups for IWFPs. In Kenya, IWFPs are not palatable to a large section of society. However, for some communities they are an essential part of their livelihoods. Cultural tastes are developed over time and in a social context, therefore domestication efforts must consider appropriate foods for the target groups.

There are some species that would be acceptable to wide range of people (from the urban to the rural areas). These would include — *Tamarindus indica*, *Dobera loranthifolia*, *Carissa edulis* and *Mimusops obtusifolia* (formerly *fruticosa*). However, we must also keep in sight the limited distribution of some species, which would limit their potential for both acceptance and domestication.

The world is changing fast, people's lifestyles are very different now and increasingly communities are taking on modern crops and practices. How do we select species that can satisfy disparate and changing needs?

Two points are essential for the success of domestication efforts:

1. To seek the views of the people through ethno botanic surveys, ranking, etc., and
2. To select species that people like.

Dobera glabra is one example. It is an evergreen tree that is sacred to some ethnic groups (e.g., the Pokot), has a sweet fruit, and is a very good shade tree. Trees with multipurpose use stand a far better chance of wider adoption. *Sclerocarya birrea* is widely appreciated in Kenya. If we can look at ways of adding value to its products, such as following the South African example of the marula wine made from the fruits, and present these to farmers and traders along with the necessary techniques, then adoption can be facilitated.

Processing, preservation and marketing are all important elements in the success of domestication and should be an integral activity to IWFP research. The length of time taken by fruit trees to reach maturity means that domestication of these species may take more time than that of the IWFP vegetable species. Advanced techniques, such as marcotting, will help with decreasing the time to reach maturity for fruit tree species.

What is needed is a strong regional network for the researchers and institutions working on IWFPs. Given the commonalities of species and the diverse knowledge available, this will help lead to faster success. At present there is a real problem with people replicating research work that has already been done. More networking within the East African countries will allow

us to share exciting results. There are some nutritional data available, but much of this is 20-30 years old. By linking the resources of institutions we can re-analyze species using more modern methods, looking at antinutrients as well as a nutrient values.

Nutritional information is an important extension tool, as nutritional profiles can help people to accept new foods. Collaboration on these issues should extend to researchers from the international agricultural research centers, the NARS and other national institutions.

There is already a body of work out there that can help us, for example the Sida funded RELMA (Regional Land Management Unit) has published a volume on the wild foods of Uganda (Katende AB et al. (1999) Wild Food Plants and Mushrooms of Uganda, RELMA) and are in the process of compiling a volume for Tanzania. IPGRI (the International Institute for Plant Genetic Resources) is launching a program on traditional foods. IWFP researchers need to monitor the progress of this and see how we can benefit from the research that is already going on.

Another important link is with the societies related to ethnobotany. UGANEB (the Uganda Group of the African Network of Ethnobotany/Ethnoecology) is one such organization.

DISCUSSION/COMMENTS FROM THE FLOOR

1. The issue of antinutrients that was brought up in the presentation is something we cannot afford to lose sight of. Not all IWFPs would be beneficial if consumed in larger quantities. Identifying safe levels of use, particularly for medicinals, must go hand in hand with other research.

2. Conservation of IWFPs is also important. While there may be some species that are under significant threat in isolation, it is important to remember that one out of every ten species in Kenya has a use as food and therefore an ecosystem approach to their conservation may be more effective.

Experiences with Indigenous Vegetables: Conservation Through Use

Monica Opole, CIKSAP

Much of the work on IWFPs has to begin from the premise that we do not have a full understanding of what is out there in the environment. Whilst there are a lot of discoveries to be made from the scientific and formal research process, we have to involve the communities to both conserve and develop IWFPS. There is a triangle in the research process, linking indigenous knowledge, agronomy and nutrition. Indigenous knowledge can be validated through more formal research methods.

It has been shown that IWFPs do have superior nutrients and vitamins over some traditional exotic crops. By analyzing the whole range of nutrients/vitamins and antinutrients, along with the inputs (chemical and organic) and pest and disease management regimes needed to ensure economically viable production, we can make inroads into the domestication process.

Working under the broad hypothesis that communities can conserve indigenous food plants through sustainable use, our research has followed the following community-driven process:

1. Development of a wish list for IWFPs (including the collection and classification of species);
2. Prioritization of species by communities and prioritization for the research process on these species; and
3. Development of the research agenda (whose vision, attitudes, merging culture with science, participatory research) — critical to validating community knowledge

Research was conducted with three different ethnic groups, both farmer-led on-farm trials and controlled on-station trials. The work was evaluated and the results documented, field tests of the selected species form the crucial feedback loop. The next step is to dissemination and adoption.

This work has helped institutionalize the participatory process in the research agenda. Dissemination activities have begun as the process is accepted in areas and new groups (age, gender) within the communities, which have started their own trial plots join. Through linkages with the national agencies, including the ministries with responsibility for agriculture and the environment and the national agricultural research agencies. The ideas and objectives behind the research process are now being mainstreamed into national, regional and international policies. Foods such as *Crotolaria* have other uses, including nitrogen fixation and increasing soil fertility, building on these multipurposes can help to ensure wider adoption. Monitoring and evaluation needs to be built in the whole process — linking research to development, dissemination and testing, and adoption.

Current activities include the production of booklets on 12 target indigenous food species. These cover both effective production techniques and manuals on how to prepare and process the foods. Recommendations on dietary uptakes for different groups (including children, lactating and pregnant women and the elderly) are incorporated in the publications.

Many IWFPs have great potential for increasing household income, if appropriate production and processing technologies can be disseminated. The challenge for us is to include the communities and people in our research and development agenda to facilitate this.

DISCUSSION/COMMENTS FROM THE FLOOR

1. There is high infant mortality during the weaning process. One major contributor towards this is protein deficiency. Techniques for extracting protein from IWFPs through processing and

combining this with groundnuts or sesame. Although these foods were found to have significant benefits for weanlings, the labour involved to extract the protein (mainly through crushing) is high. This was a disincentive to mothers in Western Kenya, where protein is readily available from *omena* (dried fish).

Indigenous Wild Food Plant Research in Coastal Regions of Kenya

Mohamed Pakia, Coastal Forest Conservation Unit

The Coastal Forest Conservation Unit has been working with a number of ethnic groups in the Coast Province in Kenya. Traditionally these groups have been users of forest resources, in particular of IWFPs. To date, 70 species of IWFPs have been identified: 50 fruit species, 11 vegetable species, 5 roots/tubers species and 4 other food related species. Wild vegetables, such as *Amaranthus* sp. and *Solanum nigrum*, are used to supplement the cultivated vegetable species (that include sukuma wiki, arrowroot, and cassava). Among the Giriama people, *Adonsonia digitata* (baobab) leaves are also used as a vegetable.

Wild vegetable use depends on availability, and the distances to available resources are strongly dependent on season. Wild fruits, which constitute the biggest number of wild food plants, are mostly eaten raw and as 'snack' foods when individuals are engaged in other activities, such as fishing and hunting. These fruits are mainly considered as food for children, however, a number of individuals within communities now collect these fruits for commercial sale. Revenue from wild fruits can be the most important economic activity for some households. There are only a limited number of wild edible tubers recognized in the region, however, all respondents to a survey identified these as important species during food shortage and drought conditions. Low utilization of wild tubers is probably related to the introduction of other drought resistant exotic species (including cassava, sweet potato, arrowroot), which do well in hard environmental conditions and are culturally accepted. It is believed that the introduction of a wide range of exotic species has also led to the loss of indigenous knowledge related to the use of wild tubers.

Market surveys showed that nine indigenous wild fruits (including tamarind, baobab and *Vitex* sp.) were traded commercially as were a limited range of wild vegetables. Technologies for preservation have not been developed for most of these species, although both baobab and tamarind were found to be available throughout the year.

Almost all collection of IWFPs is from the wild and there has been little effort put into the domestication of these crops. The cultivation of *Amaranthus* sp. is the only exception to this with some large-scale commercial efforts. There is some semi-management of wild seedlings of indigenous vegetable plants on farms.

In the coastal region of Kenya, other values including timber and NTFPs are important to the local communities. In many cases the timber value is greater than the food value of many tree species so trees will be harvested for wood. Many non-food uses of indigenous plants however are compatible with food usage (for example, weaving and medicinal production).

An important issue that should be considered when looking at IWFPs and indigenous knowledge is the practice of bioprospecting by pharmaceutical companies. The data that is collected and presented needs to take this into account and how the benefits of sharing indigenous knowledge can be returned to the communities; this is a key issue in our research.

Session 6: 26 January

Chair: Brian D'Silva

Vision and Goals of IWFP Research and Development Activities

The session broke into groups which discussed the vision and goals of IWFP research and development activities in the region. The results of these group discussions are summarized below:

GROUP 1

Vision: Livelihood security

Goal: Clear understanding and awareness of sustainable use of indigenous traditional food and medicine for prosperity.

Constraints: food security; health; nutrition; access to health services in general; marketing; coordination in research; awareness; network; policy; legislation and community rights; resources

GROUP 2

Wild food research and activities have different agendas at present: research, development, dissemination, promotion and advertising. There is a need to know what community needs and priorities are to develop our objectives. Possibilities are:

1. Contributing to peoples ability to survive and make a subsistence living in agricultural high risk areas,
2. Create/bring in additional foods and diversify agricultural production at home or house garden level to raise and diversify nutritional intake for the household,
3. Create income opportunities for rural farmers living nearby urban centers, and
4. Contribute to the preservation of a certain degree of indigenous biodiversity, erosion control, soil fertility and benefits to environmental protection

The region has a common ideal goal and problem:

To improve food and livelihood security.

Recognition of the diversity of needs implies finding a variety of viable solutions within and outside of the perspective of the countries. Therefore it is suggested that the workshop tries to develop a plan of action for the coming future (national plans of action, regional plans of action, the possibility of a network for IWFPs)

GROUP 3

Goal: To improve sustainable use of indigenous food plants.

Objectives:

1. To increase the use for food security and quality,
2. To increase production of indigenous food plants,
3. To increase the conservation of indigenous food plants, and
4. To increase the general awareness in the different communities involved in the use of indigenous food plants.

Activities:

1. An organization should be created so that baseline information on plant use by people in the communities could be collected.
2. Analyze the collected information properly and identify gaps.

3. Appropriate research should be conducted (nutritional content of IWFPs and socioeconomic surveys, etc.)

COMMON GOAL

Improved livelihood security for the people of the region through the use of indigenous wild food plants.

Objectives of IWFP Research and Development Activities

Different countries are at different stages of research and development activities. There are a number of national and regional networks working with IWFPs:

Kenya: KSE (Kenya Society of Ethnoecology, in association with NMK), Indigenous Knowledge Working Group (World Bank sponsored), Plant Genetic Resources Working Group (government and NGOs, associated with Kew Gardens), Forest Action Network (NGO); Traditional Medicine Network at Environmental Liaison Center; INFORGEN (Genetic Resources Network, including focus on medicinal plants, IPGRI sponsored network)

Tanzania: ICRAF (work on wild food trees); Traditional medicines (Ministry of Health); AVDRC (indigenous vegetables); National Plant and Genetic Resource Centre; DfID sponsoring indigenous vegetable work; University of Dar es Salaam (medicinal plants); Maasai Resource Centre for Indigenous Knowledge; Tanzania Food and Nutrition Centre

Uganda: Ministry of Agriculture, Animal Industry and Fisheries; NARO (National Agricultural Research Organization); UGANEB (the Uganda Group of the African Network of Ethnobotany/Ethnoecology); People and Plants Initiative; Makerere University Institute of Natural Resources; National Chemotherapy Research Laboratory; National Council of Science and Technology

Sudan: National Resources Committee; IDEAS (Institute for Development, Environmental and Agricultural Studies)

Ethiopia: UN-EU; Ethiopia Health Institute; National Herbarium (Biodiversity Institute); NAPRECA (Network on Natural Product Research for East and Central Africa)

Rwanda: Research Center for medicinal plants

Burundi: ISABU (Institut des Sciences Agronomiques du Burundi)

Regional: SEPASAL (Arid zones); Commonwealth Secretariat Regional Health Program (based in Arusha); African Ethnobotany Network; AETFAT (Association for the Taxonomic Study of the Tropical African Flora); Valorization of plant material network (IDRC-based); People and Plants Initiative (UNESCO, WWF and SEPASAL program); PROTA (Plant Resources of Tropical Africa, based in Brussels).

The work that participants are doing is different from that of these networks and institutions is:

1. More people-centered than institutional research,
2. Looking for local solutions,
3. Action-oriented in addition to having the scientific classification of species,
4. Need practical solutions, and
5. Scale up activities and awareness.

POLICY ISSUES

Domestication is a regional issue, but has national and local components. User rights and community legislation are areas that have not been addressed widely in the region. Although legislation often comes after we have tangible products and systems, without these issues being addressed early in the process situations can develop where some groups are able to exploit the more vulnerable sectors of society. Cross boundary movement of genetic material needs to be considered. Promotion of IWFPs needs policy backing and representatives with responsibility for the sector. Without the development of policies on IWFP use and promotion they cannot be mainstreamed into development and food security agendas.

INTELLECTUAL PROPERTY RIGHTS (IPR)

There are a large number of bodies now looking into the whole issue of IPR. Royalties, revenues and mechanisms for compensating communities for their knowledge have to be considered. There are at present a large number of gaps in the legislation of most of the countries in the region. IWFP research and activities need to take on board these issues and help to make sure that the voices of the communities are heard in the process.

MEDICINALS

In addition to the IPR issues, the safety and efficacy of medicinal plants must be incorporated into research. Ethical issues (including the promotion of medicinal IWFPs over conventional medicines) should also be included.

NEXT STEPS

Distribution of proceedings. Proceeding will be available for distribution by mid-February 2001 and will be sent electronically to those with access to email and by post to the remaining participants. The proceedings of the discussion will be available to people mid-February (electronically). Hard copies will be distributed to those who do not have access to email. Copies will also be sent to the organizations identified below as stakeholders in the IWFP agenda and to other relevant organizations and individuals identified by participants.

Follow-up workshop. A follow-up workshop will be organized (date to be determined) to re-evaluate the status of work in the region and the need for formal networks.

Focal points were identified for Ethiopia (**Dechassa Lemessa**); Sudan (**Luka Biong Deng**) and Uganda (**John Tabuti**). Focal points for the other countries will contact the organizers of the workshop when appointed. These focal points will help to formalize the links between countries to facilitate the flow of information and dissemination of existing materials between researchers. At present, a formal network will not be established as the costs (in terms of both time and money) of management and maintenance of such a network would be prohibitive

Expansion. Ethiopia would like to broaden the scope of discussion in future to include animal food sources.

There will be a nutrition workshop in 2002 held at Tuskegee University. Eloise Carter will inform participants of the dates of the workshop when they become available and a number of individuals will be invited to attend. USDA will seek funding for the participation of these individuals.

ORGANIZATION IDENTIFIED BY PARTICIPANTS

Appropriate Technology Organizations

ATI — Appropriate Technology International (Washington-based)

U.S. Peace Corps

VSO — Voluntary Service Overseas (UK-based organization with country offices)

ITDG — Intermediate Technology Development Group (UK-based, Kenya country office)

IRSAT — Insitut de Recherches en Sciences Appliquees et Technologiques, Burkina Faso, 03 BP 7047, Ouagadougou

Domestication Organizations

ICRAF — International Centre for Research in Agroforestry

IPGRI — International Plant Genetic Resources Institute

AVDRC — Asian Vegetable Development Research Centre

Limbe Botanic Garden, Conservation through Cultivation Programme, PO Box 437, Limbe, Fako, Cameroon. Tel: 237-33-24-20. Email: mcplbg@iccnet.cm

CIKSAP — Centre Indigenous Knowledge Systems and Products

Workshop Programme

Tuesday, January 23

SESSION 1

8:00 Official welcome
Dirk Dijkerman, *USAID/REDSO Director*

8:15 Overview of the workshop
Brian D'Silva, *USAID*

8:30 Potential of indigenous food plants to support and strengthen livelihoods in southern Sudan
Birgitta Grosskinsky, *CRS/Sudan* and Caroline Gullick, *University College London*

10:00 Break

10:30 Food security and the role of indigenous wild food plants in south Sudan
Mary Abiong Nyok, Christine Foustino, Luka Biong Deng and Jaden Tongun Emilio

12:30 Break

SESSION 2

2:00 The wild foods database for south Sudan
Birgitta Grosskinsky, *CRS/Sudan* and Caroline Gullick, *University College London*

3:30 Food source diversification: potential to ameliorate the chronic food insecurity in Ethiopia
Getachew Olana, *Consultant*

4:30 Close

Wednesday, January 24

SESSION 3

8:00 Wild-food plants in Ethiopia: Reflections on the role of 'wild-foods' and 'famine-foods' at a time of drought
Yves Guinand and Dechassa Lemessa, *UN-Emergencies Unit for Ethiopia*

9:00 Domestication of indigenous wild foods plants
Rudy Shippers, *NRi*

10:00 Indigenous vegetable species in Tanzania.
Damas Marandu, *HORTI Tengeru*

10:30 Break

11:00 Informal discussion on the role of indigenous wild foods in Somalia
Mahdi Kayad and Suleiman Mohamed, *Food Security Assessment Unit-Somalia (FAO)*

11:30 Non-timber forest products in Central Africa: Issues of conservation and cultivation
Laurie Clark, *Consultant in Non-Timber Forest Products*

12:30 Break

SESSION 4

2:00 Uganda Presentation
John Tabuti, *Makerere University*

3:00 The nutritional and medicinal importance of indigenous (and traditional) food plants.
Christine S. Kabuye and Grace W. Ngugi, *National Museums of Kenya*

4:30 Close

Thursday, January 25

SESSION 5

8:00 Indigenous wild food plants: their future in Kenya
Patrick Maundu, *Kenya Resource Centre for Indigenous Knowledge*

9:00 Experiences of indigenous vegetables conservation through use
Monica Opole, *Centre Indigenous Knowledge Systems and Products*

10:30 Break

11:00 Indigenous wild food plant research in costal regions of Kenya
Mohamed Paki, *National Museums of Kenya, Coastal Forest Conservation Unit*

12:00 Field trip to Ukunda Research Station

3:00 Close

Friday, January 26

SESSION 6

8:00 Open Discussion
Chair: Brian D'Silva, *USAID*

10:00 Break

10:30 Wrap up session and next steps
Chair: Brian D'Silva, *USAID*

12:00 Close

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