Exploring the Potential of Indigenous Wild Food Plants in Southern Sudan

Proceedings of a Workshop Held in Lokichoggio, Kenya, June 3-5 1999

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Contents

Foreword

In the last few years, a number of different research and data collection activities in the field of indigenous food plants have been undertaken in southern Sudan. To date, three studies have been carried out: Save the Children and World Food Program (WFP) supported an independent study of Bahr el Ghazal, Upper Nile, Lakes and the Ironstone Plateau; UNICEF carried out a similar study in eastern and western Equatoria, parts of Upper Nile and Bahr el Ghazal; and German Agro Action carried out a further study in eastern Equatoria. The purpose of the studies was to gather baseline information on idigneous wild food plants, IWFPs, i.e., their nutritional value, their importance and the acceptance of IWPFs among southern Sudanese communities and individuals.

In these studies it was found that: the foods are a part of the normal diet; are crucial to people's survival during times of food shortage; have the nutritional equivalent of – and in some cases are superior to– introduced vegetables and fruits; play a major role in the diet of children; are both palatable and enjoyable; are of particular economic importance to the poor and to women in general; are used to protect family assets; have been domesticated; diversify the diet; and are adapted to their environment.

In addition to the findings of the studies, information on the nutritional value of wild food plants and the frequency of their use has proven to be of great importance in southern Sudan. In order to share such knowledge, this workshop, "Exploring the Potential of Indigenous Wild Food Plants in Southern Sudan," was held in Lokichoggio, Kenya from 3-5 June 1999. For it is only through sharing this information about indigenous wild foods that they can be fairly evaluated and their contribution to the daily diet understood.

The workshop was sponsored by the U.S. Agency for International Development and organized by WFP and Catholic Relief Services (CRS). More than 50 participants from Sudanese Relief and Rehabilitation Association (SRRA), Sudanese People's Liberation Movement (SPLM), non-governmental organizations (NGOs) and representatives from institutions who are working in projects connected with indigenous food plants attended the workshop. Ten participants were asked to give presentations on the different aspects in connection with the use and the potential of indigenous food plants.

Objectives of the Workshop

- To share knowledge on the use and potential of IWFPs within South Sudan and within the region (Kenya, Uganda and Tanzania).
- To bring together people from different backgrounds and from different agencies to better understand their perception of IWFPs.
- To promote among relief and development workers a practical understanding and appreciation of this natural resource, which is available to be utilized by a wide range of people in southern Sudan.
- To discuss how an understanding of IWFPs can be used to improve the implementation of existing and future programs and activities of SRRA, UN programs and NGOs.
- To encourage and support the local authorities interested in the sustainable exploitation and conservation of this renewable resource so that they in turn will encourage local initiatives for sustainable development of natural resources among the people in southern Sudan.

Organization of the Workshop

The workshop was initiated through discussions with SRRA, USAID and the researchers involved in the IWFP field studies mentioned. The need to make the findings of IWFP research freely available to those involved in food security activities in southern Sudan was felt to be the top priority, which led to the staging of this workshop. Through numerous discussions, it became clear that there is a need to integrate and mainstream the information into the following programs: food security, health, nutrition, agriculture, environmental management and education. This preliminary

workshop was held for policymakers from the SPLM-held areas of southern Sudan and for UN and NGO staff and donors in order to establish a common language and achieve participatory feed back on research to date, its utilization and future direction.

NGOs, UN agencies and SRRA were invited to select participants for the workshop. Topics were selected by the organizing committee from discussions with different agencies/institutions involved in the sectors mentioned above. Participants who received invitations were also requested to suggest further topics for discussion. (For a list of participants see Appendix 1.)

Workshop Topics

- Introduce the present state of consumption and production of indigenous food plants in southern Sudan;
- Outline the agricultural and economic potential of indigenous food plants, drawn from experiences and case studies in other African countries;
- Provide sources of information on IWFPs in southern Sudan;
- Identify areas and gaps in the research;
- Examine the possibilities of integrating the information about IWFPs into health, nutritional, agricultural, formal and non-formal educational programs by combining scientific information with indigenous knowledge. This integration will promote local solutions to malnutrition and disease, boost food production, market expansion and environmental awareness;
- Identify practices which impact the sustainable use of indigenous resources; and
- Identify and suggest solutions to production constraints and the consumption of these plants.

Acknowledgments

We would like to thank the U.S. Agency for International Development (USAID) for funding the workshop and for their support of the indigenous wild food plants study. Also, we would like to thank the World Food Program (WFP) and Catholic Relief Services (CRS) for their support and encouragement. We also appreciate the efforts of all those who prepared and presented papers. We would also like to give special thanks to Jason Matus, Doreen Wright and Megan Secord for their help throughout the workshop. A special thanks goes to Kisuke Ndiku, who facilitated the workshop.

The views expressed in the papers presented are those of the authors and do not necessarily reflect the views of the participating organizations.

The knowledge contained in the "Wild Food Plant Database" collected from southern Sudan remains the intellectual property of the people and communities from which it came. We are extremely grateful for the co-operation and hospitality given to us by the people of southern Sudan during the research and thank them for their time and patience.

It is hoped that the information gathered will increase understanding of the importance that indigenous wild plant foods have to many people; it is a resource widely ignored by planners and policymakers. Appropriate management and protection of the resource needs to be mainstreamed into programs pertaining to food security and formal and informal education in Sudan and other countries. It is of particular importance to sensitize people involved in agricultural, nutritional and educational programs to the broader implications for food security and the environment that dramatic changes in land use and ownership may engender.

(For further information about the data base and the workshop please contact Caroline Gullick, World Food Program, in Nairobi, and Birgitta Grosskinsky, Catholic Relief Services/Sudan.)

Executive Summary

Pascal Bandindi, Secretary for Agriculture and Animal Resources, SPLM, gave the welcoming address. His speech was followed by a welcoming address from John Marks of USAID. Both emphasized the importance of indigenous resources for southern Sudan and the need to raise awareness about the potential of natural resources, especially regarding their importance to the individual, the environment, biodiversity and the future economy.

During the workshop representatives from different institutions/organizations in Sudan and from institutions operating within the region of East Africa gave presentations on the use of IWFPs and their potential to food security. The presentations also highlighted the need for the sustainable management and conservation of indigenous resources and knowledge. Biases and stigmas associated with the use of wild food plants were also examined along with ownership rights and regulations that influence the use of indigenous resources.

Apart from the topics mentioned above, the main theme throughout the workshop was the need to raise awareness among international and national agencies on the value of indigenous resources. The importance of recognizing the value of people's local knowledge and sharing scientific knowledge from outside South Sudan was stressed. During this process, it is also essential to share this information with food relief agencies and to build on local knowledge of IWFPs through formal and informal education. It was felt that failure to do this would result in programs that may, in the long term, jeopardize food security rather that enhance it.

Output

After group discussions the participants were asked how they would like to be grouped in order to form their recommendations. It was decided that there should be four groups: nutrition, agriculture, Sudanese and general. The following section is a summary of the recommendations, which were presented to the forum by each group.

Research

- Continue current research;
- Analyze nutritional value, anti-nutrients and toxicity of IWFPs;
- Study current food processing methods;
- Improve processing methods;
- Study and understand economic and agricultural potential;
- Retain knowledge of IWPFs in order to enhance food security for future generations;
- Expand the list of research personnel to include official Sudanese researchers;
- Have agricultural co-coordinators identify Sudanese people who will continue to assist with data collection and review existing data and baseline information;
- Research and record customary laws which relate to ownership, utilization and protection of natural resources; and
- Understand the use of carefully selected IWFPs, which fulfill the nutritional requirements for weaning preparations and supplemental food preparations.

Data

- Improve access to the existing data and develop an information network in OLS/Counterparts and other organizations working in South Sudan and the region.

Education

- Include information from research findings in Sudan and other countries in all levels of formal and informal education as it is essential for the

people to fully realize the benefits of this resource;

- Raise awareness about the potential and value of this resource and the need for protection and management;
- Raise awareness through demonstrations on the use of the plants;
- Include indigenous knowledge in the school curricula and informal education programs;
- Include information on the nutritional properties of IWFPs in nutritional training programs at the community level;
- Demonstrate the availability of local solutions to nutritional deficiencies and improving diets;
- Include IWFP information in agricultural extension training programs which promote plants that are nutritious, productive and adapted to their environment; and
- Raise awareness of the importance of local plant species in the protection of the environment.

Policies

- Review and, where appropriate, amend current policies concerned with the preservation and conservation of indigenous resources;
- Identify the rights and laws of ownership of natural resources;
- Develop policies protecting peoples rights and access to IWFPs in consultation with those who most use the resource; and
- Have international organizations working in southern Sudan develop policies which ensure that proper consideration is given to the utilization of available resources in program planning and proposal writing.

From the forum a focal group consisting of nine participants was appointed. This focal group was proposed to discuss immediate strategies of how the recommendations could be brought in practice. They were expected to come up with more detailed but tangible recommendations and suggest who else should be involved.

Workshop Program

Day 1

9:00	Welcoming Address, Pascal Bandindi, Secretary for Agriculture SPLM
	Welcoming Address on Behalf of USAID, John Marks, USAID
10:00	Exercise 1: Expectations
10:15	Refreshments
11:00	Paper 1: Global Overview, Fiesta Warinwa, African Wildlife Foundation Species
11:15	Exercise 2: Definition of Indigenous Wild Food Plants (IWFPs)
11:45	Exercise 3: Negative and Positive Perceptions of IWFP
12:00	Paper 2: The Role of IWFPs in Food Security and Early Warning Systems: the 1998 Case of the Bahr el Ghazal Famine, Luka Biong, SRRA Database Manager
12:30	Lunch
14:00	Paper 3: Nutritional Contribution of IWFPs , Birgitta Grosskinsky, Catholic Relief Services
14:30	Paper 4: Case Study from Kenya on Indigenous Wild Vegetables, Grace Ngugi, Assistant Ethnobotanist, KENRIK
	Discussion
15:45	Refreshments
16:00	Paper 5: Tapping the Potential Use of IWFPs in the Sustainable Eradication of Food Insecurity for the People of Southern Sudan, Acuil Malith Banggol, SUPRAID
16:30	Exercise 4: Exercise on the Economic Potential of IWFPs
	Discussion
5:30	End of session

Day 2

9:00 Overview of Day 1

9:15 Paper 6: Contribution of Wild Food Plants to Acholi and Madi Food Basket, compiled by Lawrence Otika Joseph, CRS/Sudan, and Cirino O. Oyiki, CARE/Sudan

9:30 Paper 7: Research on Indigenous Food Plants in Southern Sudan, Caroline Gullick, WFP

Discussion

10:30 Refreshments

10:45 Exercise 5: Exercise Based on a Proposed Pilot Rehabilitation Project, presented by Jean-Pierre Mambounou, WFP

12:00 Presentation of Group Work

12:30 Lunch

14:00 Paper 8: AVRDC/Africa Regional Program: Scope of Activities on Indigenous Vegetables, Remi Nono Wondim

Discussion

15:15 Refreshments

15:30 Paper 9: Community Resource Rights, Christine Kabuye, Former Botanist, East Africa Herbarium.

Discussion

16:30 Paper 10: Customary and Civil Laws Regulating People's Rights to Wild Natural Resources in Southern Sudan, Judge Deng Biong

Discussion

17:30 Video: "Glimpses of Hope" (Worldview/Kenya)

18:00 End of session

Day 3

9:00	Overview of Day 2
9:15	Exercise 6: Constraints to the Utilization and Promotion of Indigenous Wild Food Plants
10:00	Refreshments
10:15	Exercise 7: Recommendations for the Future of the Resource
	Discussion and Finalizing Recommendations
13:30	Conclusions
13:30	Evaluation
13:00	End of session

Glossary of Acronyms and Abbreviations

AVRDC	Asian Vegetable Research Development Center
AWF	African Wildlife Foundation
CRS	Catholic Relief Services
FAO	Food and Agriculture Organization
FEAU	Food Economy Assessment Unit
IWFP	Indigenous Wild Food Plant
NGO	Non-Governmental Organization
OLS	Operation Lifeline Sudan
SCF	Save the Children Fund
SPLM	Sudanese Peoples Liberation Movement
SRRA	Sudanese Relief and Rehabilitation Association
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WFP	World Food Programme

Opening Remarks

Mr. Bandindi Pascal Uru,
SPLM/SRRA Agriculture and Animal Resource Secretary

Introduction

I express my profound appreciation and humble acceptance to attend this workshop, entitled "Promotion of IWFPs in South Sudan." Personally, and I believe all of us here, would like to register our deep gratitude to the organizers who have given meticulously thought to the subject matter of this rare kind of workshop and who have successfully planned it with all the resources required for its convention, today, 3 June 1999.

In perusing the agenda and the objectives of this workshop, one is tempted to assume that we are to prescribe solutions to household food economy problems. Rather, one would recommend, we should focus on the types or topics of research and investigations into wild food sources in South Sudan.

Perhaps, such feasibility studies would, among others things, address the following:

- Quantity, quality and types of wild food of South Sudan;
- Protection and sustainability of wild food sources, especially the availability level, during the hunger gap period;
- The section of the population that actually exploits wild foods and how these are shared or distributed at household and community level; and
- We might also establish any traditional or cultural control mechanism that exists in each ethnic community to enhance sustainable utilization of the indigenous wild food items.

Wild Food in South Sudan

Historically, we have been told and have learned that early human beings used to live in caves and collected their food for consumption from the wild environment. It is the concept of "domestication" and other technological achievements that has civilized our planet. Anthropologist all over the world, have researched into this phenomenon and their writings and other documentation have provided sufficient evidence which some of us may wish to revisit when addressing indigenous food plants in South Sudan.

The identification, collection and utilization of wild food sources in South Sudan are therefore not an isolated exercise. Even today, the U.S., the U.K., and continental Europe, as well as the highly industrialized Japan, are still eating delicacies such as seafood and whale meat from the wild. However, in the South Sudan situation, recurrent famine and other forms of hunger due to floods, drought and insecurity/displacement due to war has called for a comprehensive study of the impact of wild food on local, household food economy. Various categories of wild food sources that have pronounced implications on the human dietary pattern include:

- Fish and some reptiles;
- Game meat;
- Fruits and roots tubes/kernels;
- Leaves/flowers as vegetables;
- Insects, e.g., termites and locusts;
- Wild oil seeds (shea nuts);
- Wild cereals, e.g., wild rice *(Oryza punctata);* and
- Others, e.g., native honey, salt, etc.

Challenges and Recommended Topics for Research

In completing this task of scientifically identifying and categorization the wild foods of South Sudan by their respective ecological zones, help from various ethnic communities was paramount and may not be underestimated by this august workshop.

Areas of concern that are worth considering may include the following:

- The late burning of the bushes, which results in the destruction of trees, vines, shrubs and grasses. Ideally, and legally enforced, early burning tends to reduce the degree of vegetation destruction. Hence, it is a system of protection to wild food sources.

- Human displacement due to war insecurity or from natural calamities also deprives hunger victims of their traditional or indigenous and culturally accepted wild food sources.

- Some wild foods are typically seasonal and may be utilized in the situation of complex emergencies. However, tubers and bulbs used as wild foods usually act or serve as strategic food reserves, especially in cases of pests/disease infestation, and so help to full the hunger gap.

- Integration of wild foods into the diets of household members on a regular basis is constrained by non-domestication of wild food sources.

- The level of toxicity of some wild foods has yet to be determined in a bio-chemical analysis process, and their sustainability and palatability for human consumption needs to be ascertained. Later in this analysis, the nutritional convention ratio for body intake of various compounds or nutrients in particular wild foods will need in-depth study. This will enable humanitarian workers and home economists to recommend wild food preparation to vulnerable groups and other population categories.

- Accessibility to wild food sources may be hampered by lack of bridges over rivers or by the lack of safe roads or paths across highlands and through thick forests inhabited by snakes and other dangerous wild animals, e.g., cheetah, leopard, lions, elephants etc. The questions posed in this instance would be "who collects what wild foods; how these are shared or distributed among the population at household and community levels, and at what costs?"

- Finally, some elite and urban dwellers have demonstrated some negative attitude toward wild foods and their consumers. Social diversity of the so-called upper class citizens of South Sudan advocates that those who eat wild foods are primitive and generally have a low standard of living. This tendency hampers the promotion of indigenous food plants in terms of identification, selection and marketing for consumption. It also discourages scientific studies into wild foods sources, which could save lives and improve health.

Concluding Notes

Thomas A. Addison (1847 – 1931) once predicted "the doctor of the future will give no medicine, but will interest his/her patient in the care of the human frame, in diet, and in the cause and prevention of diseases".

Most of the wild foods of South Sudan have both nutritional and medical values and need only specific proof of this hypothesis.

The British writer stated "No man can love God or serve his neighbor on an empty stomach." God gave the people of South Sudan wild foods, and humanitarian workers, by convening this historic workshop, will come up with recommendations that will be practical and applicable.

May I take this golden opportunity to express my sincere gratitude and that of the people of South Sudan to the WFP/UNICEF and all NGOs and donors who have come to our aid in addressing household food economy problems. Many lives have been saved, and this workshop is another gigantic step in the analysis of food economy in South Sudan.

Thank you all.

Welcoming Address on Behalf of USAID

John Marks, USAID

I am very happy to be here to open this workshop that USAID is sponsoring together with our partners WFP, CRS and the southern Sudanese people.

It is important to note that this workshop has been designed from the outset as a participatory workshop involving a number of institutions and individuals not only from Sudan but also from the region. There are clear regional implications in the sharing of lessons and information to be derived from this workshop.

In light of last year's famine in Bahr el Ghazal, the importance of wild foods cannot be underestimated both in Sudan and the region. It is important for us to collectively increase our understanding of wild foods, their use and nutritional value, and their importance in the livelihoods of people.

USAID support for this workshop shows the importance that we place on this subject and also on the entire role of information about nutritional analysis and the broader aspects of this topic, including the need for education on this subject at the grassroots level.

We are hopeful that the outcome of this workshop will lead to a co-coordinated effort in the collection and analysis of information on wild foods, not only in South Sudan, but also the Greater Horn of Africa Region. In this sense, this activity can be viewed as a pilot for the region as a whole.

Interest in the use of wild foods stems from understanding their role in food economy and their importance to biodiversity and conservation efforts to maintain this biodiversity. We are fortunate to have with us the Secretaries of Agriculture, Wild Life and Conservation, the Commissioner of Wau and the Chairwoman of the New Sudan Women's Federation amongst us as this workshop should lead to an integrated approach to this very important topic.

In the U.S., we eat many wild foods – fruits, nuts, berries and leaves – for both nutritious and medicinal purposes. An example is wild rice, which actually costs more than wheat or maize in the U.S. market.

I know that Brian d'Silva wanted to be here but unfortunately could not make it. He asked me to specifically congratulate all of the participants and especially those who have worked so hard to make this workshop a success. Caroline Gullick of WFP and Birgitta Grosskinsky of CRS and all the SRRA staff present here today.

I look forward to taking part and learning from these deliberations and implementing your recommendations and suggestions in the future.

Best wishes for a successful workshop.

Exercise 1

Expectations

The participants put forth the following expectations, which have been complied into four categories:

Awareness and Education

- To acquire information about IWFPs in southern Sudan;
- To learn about the importance of IWFPs as a food resource;
- To improve our understanding of wild food in South Sudan;
- To learn of acceptability levels;
- To become aware of available varieties in different areas;
- To identify people – either indigenous or NGO workers — who know the IWFPs;
- To understand the geographical distribution of IWFPs in southern Sudan;
- To learn from regional experience which wild fruits can be of use in southern Sudan;
- To share knowledge on the role and the importance of indigenous resources in southern Sudan;
- To create an awareness of the value of indigenous resources and their contribution to food security; and
- To share information on wild food plants and to learn more about diversity of wild food plants.

Nutrition

- To acquire information about the nutritional value of various IWFP species found in South Sudan;
- To understand how the consumption of IWFPs can be maximized;
- To have a better understanding of the nutritional value of IWFPs and their medicinal value;
- To learn more about the nutritional value and methods of processing and preserving IWFPs; and
- To find out more about the beneficial and harmful components of IWFPs.

Food Security, Economic and Agricultural Potential

- To understand the seasonality and consumption pattern of IWFPs;
- To learn about the potential of developing these IWFPs and their cultivation;
- To understand the interest of international and private bodies in promoting IWFPs domestication;
- To learn other people's perceptions of IWFPs in southern Sudan, in order to find a way of encouraging its use in different communities;
- To learn more about wild food and cultivation of indigenous trees;
- To understand the wealth of IWFPs in southern Sudan;
- To know more about the benefits of IWFPs;
- To understand how IWFPs fit into agricultural activities schedules and how labor intensive collection and preparation is;
- To find ways IWFPs can contribute to the livelihood of (war-)effected population in southern Sudan
- assess income generating possibilities;
- To discuss the possibilities of better utilization of indigenous resources;
- To design a realistic action plan to improve the production and consumption of IWFPs in southern Sudan; and
- To learn more about the domestication of IWFPs.

Others

- To share knowledge and learn more about the conservation, domestication, diversification and uses of IWFPs;
- To share views on biodiversity and conservation;
- To learn more about availability and diversity of uses of IWFPs in southern Sudan;
- To increase understanding of wild foods in order to carry out efficient food assessment / monitoring;
- To see that efforts to improve wild food consumption and preservation are co-coordinated;
- To understand how can existing information on IWFPs be used;
- To develop a strategy for the conservation and appropriate utilization of IWFPs;
- To develop recommendations which should be implemented by the New Sudan civil authorities and NGOs; and
- To explore uses of IWFPs in the food economy and its inclusion in food economy assessments.

Paper 1

Global Overview

Fiesta Warinwa, African Wildlife Foundation

Introduction

Around the world, indigenous people are the caretakers of sacred knowledge about the unity of all living things and life processes, from genes, micro-organisms and species, to human societies and the ecosystems in which we live. Wild plants have always been significant in all their cultures, being used for food, medicines, fuel and many other purposes. The great interest in the use of the wild plants has been based on the assumption that plant resources will be available on a continuing basis. As a result, no concerted effort has been made to ensure this assumption, in the face of the threats posed by increasing demand, increasing human population and extensive destruction of plant rich habitats, is correct.

In Africa, most of the indigenous resources are under the same threats for exactly the same underlying reasons as elsewhere in the world: the inability of humans to live within the limits imposed by their environment. In most places, a greater demand is placed upon these resources than they are able to replace by themselves at natural rates.

In the past, people who lived traditional lifestyles, which were in harmony the surrounding ecosystems, had usually developed ways of living with nature, which did not result in the over-use of the resources upon which they depended. Unfortunately, this is not the case today. There is a decreasing number of people who live in such a way and, as a result, natural resources cannot be sustained in the long-term. Some of the major threats facing not only indigenous resources, but natural resources as a whole, are:

Over-Exploitation

As earlier mentioned, rural people throughout the world harvest wild resources for food, shelter, traditional medicines, dyes, fibers, tools, religious purpose and cash incomes. Such harvests in the past were motivated by cultural traditions, survival needs and, to a greater extent today, for cash income to supplement earnings from other sources.

Extraction of elements such as fuel wood by rural communities, perhaps once within the carrying capacity of surrounding forests, has now crossed the limit in many areas. Urban and industrial demand for fuel wood and charcoal has become one of the major factors in forest degradation and deforestation. The fuel shortage was identified as “poor man’s energy crisis,” which affects more than two billion people worldwide. Studies have shown that over 100 million people in developing countries cannot get sufficient fuel to meet energy needs and almost 1.3 billion people are consuming fuel wood faster than it is being replenished. For example, in Niger 99 percent of the domestic energy and 80 percent of primary energy requirement are met from wild harvested wood.

Continuous harvesting of timber for furniture making has caused a dramatic decline in numerous plant species and this situation has had a profound effect on the biodiversity of many forests ecosystems. Timber harvesting has been found to reduce diversity in terms of tree species and structural variation, although early successful stands, which develop soon after harvesting, may have high biodiversity.

Today, many medicinal plants face extinction or severe genetic loss, but detailed information is lacking. For most of the endangered medicinal plant species, no conservation action has been taken. Instead, too much emphasis has been put on the potential for discovering new wonder drugs and too little on the many problems involved in the use of traditional medicines by the local population.

In many countries, there is not even a complete inventory of medicinal plants. Much of the knowledge on their use is held by traditional societies whose very existence is now under threat. Little information has been recorded in a systematic manner.

Habitat Clearance and Alteration

Habitat clearance and alteration is considered as the most important threat and is probably resulting in the extinction of many species, both plants and animals.

The removal of habitats such as forests do not only have a direct impact on ecosystem diversity but on plant species as well.

The rapid destruction of the world's most diverse ecosystems, especially in the tropics, has led most experts to conclude that a quarter of the earth's total biological diversity, which includes indigenous resources, is at a serious risk of extinction. By many indications, the world is already experiencing extinction rates of greater scale and impact than at any previous time in the earth's history. More indigenous resources than ever before are being threatened with extinction.

Global closed forest is estimated to have covered three million hectares in the early 1980s. This area was almost evenly split between temperate and tropical areas of which the tropical forests are thought to contain at least 50 percent of the species of the globe. However, with continuous deforestation, it is known that the disturbance of the forests affects both plants and animals species. Further effects include: habitat loss; habitat fragmentation and edge effects at the boundary zone between forested and deforested areas.

Conclusion

In the western world, resources conserved are those for which people have no immediate need, but this is not the case in Africa. In Africa, people are being asked to conserve indigenous resources, which they depend on for their everyday needs. No single sector, be it private or public, can undertake the conservation of indigenous resources alone. The job requires a team effort involving a wide range of disciplines and institutions. One of the best ways to start the process is by involving the local communities, making them aware of the conservation benefits of their indigenous resources and how their knowledge of indigenous technology, such as debarking, led to positive conservation practices and how they used it for mapping their resources.

The second way is by preparing a strategy for the conservation and sustainable use of their resources, because it is virtually impossible to expect people to change their attitudes towards indigenous resources when they do not understand the conservation issues at stake.

Once the strategy is set it will help them in:

- Developing a consensus on what needs to be conserved;
- Assigning tasks to different institutions that will help them achieve conservation objectives of the indigenous resources;
- Motivating participants, especially from the local communities, who use the resources more often to undertake the tasks; and
- Monitoring progress.

In the case of medicinal plants, perhaps one of the best ways to provide the plant material needed for the medicines is to cultivate the plants. Cultivation would be far better than collecting them from the wild because it would not deplete the wild stocks. Also, cultivation will help local communities benefit financially by selling plant materials (when cultivated in large quantities) to pharmaceutical companies.

In the case of rare, endangered or over-exploited plants, cultivation could be the only way to provide material without further endangering the survival of those species.

Discussion/Comments from the Floor

1. There is a need to involve communities and to create dialogue in developing solutions. Often, communities that may have suggestions about how to implement programs, are forced to accept externally developed solutions, possibly without fully understanding their rationale.

2. Information and training must be provided to the community. Sending tools may be a well-intended relief activity, but inappropriate use of the tools will undermine resources rather than protect them. Unsuitable agricultural practices are likely if training is not provided.

Exercise 2

Definitions of IWFPs

The forum was divided into four groups and asked to give definitions for the following two terms:

- Indigenous
- Wild food plants

Indigenous

Group 1: Of local origin, native to a given area

Group 2: Originating from a specific area

Group 3: Original to a specific area

Group 4: Of local or native origin

Wild Food Plants

Group 1: Naturally growing edible plants

Group 2: Naturally growing edible plants, freely available

Group 3: Edible, indigenous, non-domesticated plants

Group 4: Uncultivated edible plants

Discussion/Comments from the Floor

1. The word “uncultivated,” which was mentioned in the definition of “wild food plants,” was discussed. Examples were given involving a root, which is harvested in the wild and from which a slip is replanted to allow for further gathering.
2. A second point of discussion was about wild food plants, which are grown in gardens/fields. Some participants called them “weeds.” Some other participants argued against this statement. According to these participants, a plant is called a “weed” if it is not used as a food plant or if it is not valued, but it is called a “food plant” if it is useful or eaten.

Exercise 3

Positive and Negative Perceptions of IWFPs

Participants were asked in an open forum to put forward any positive or negative perceptions they had about IWFPs and those they had heard from others.

Positive Perceptions	Negative Perceptions
• Available for children • Food diversity • Income generating • Long shelf life/storage • Seasonal • Famine food • Medicinal value • Are good for soil and water • Diversity of usage • "Freely" available • No pesticides or other chemicals necessary • Easily digestible • Nutritious • Low cost • Tasty • Better adapted to the environment	• Uncivilized • Famine food • Poor people's food • Toxic • Labor intensive • Difficult (long distances) and dangerous (wild animals) to access • Low production • Poor quality • Cultural stigmas • Low nutritional value • Equated to children's diseases • Not palatable • Seasonality (not available during certain times)

From the comments it can be seen that the same points can be viewed in a positive and a negative light. For example, IWFPs are said to be both nutritious and of low nutritional value depending on the perception. This shows clearly that it is important not to label such a broad variety of foods with one label. For example, if IWFPs were classified as are not nutritious, this would imply that they are not a component of food security and would discourage further investigation into such foods. Each food should be judged on its own merits. It would be like stating that all tubers are bad for you because some, such as cassava, contains harmful toxins. We know this not to be the case because properly prepared cassava is no longer toxic and that there are a large number of other tubers, i.e., carrots, sweet potatoes, radishes, etc. which are far from harmful.

It shows that perceptions can be indicators but that they should not be taken in isolation of other information because perceptions are influenced by social, cultural, political, economic and gender factors.

Paper 2

Role of IWFPs In Food Security and Early Warning Systems: the Case of the 1998 Bahr el Ghazal Famine

Luca Biong Deng

Introduction

A clear understanding of the role of wild food plants in the Dinka's food security entails a brief description of their tradition and culture as people. According to the 1956 census, Dinka was the largest ethnic group in southern Sudan and constituted about 12 percent of the total population in the Sudan. The area inhabited by Dinka was estimated, according to the 1983 census, to be about 13 percent of the total area of the Sudan. Northern Bahr el Ghazal, according to the 1983 census, was one of the most densely settled Dinka areas, with the second highest population density (28.7 persons/mile square) after El-Bohayrat (30.2 persons/ square mile) in southern Sudan. The Dinka live in overwhelmingly rural societies, and the area in which they live has extreme climates conditions ranging from a wet season (May to October) to extensive flooding to a dry season involving drought and desiccation. The area is virtually flat, a mixture of open grassland, swamps (toic) and savannah forest.

The culture of Dinka, like other Nilotic groups, is centered around basic values, with procreation as the foundation and the yardstick for stratification (Deng, 1973:85). According to Deng (1973:86), procreation is only a starting point for a complex set of values such as affection, respect, rectitude, and the power of persuasiveness which rank higher than the material value. In reinforcing this observation Keen (1994:19), remarks that Dinka have sometimes valued the maintenance of their culture and economic independence more highly than they valued their own short-term consumption and appear to put a higher value on their way of life than on life itself. At the core of this complex set of values is what Dinka call *cieng*, a concept of ideal human relations that is reinforced by the ideals of human dignity expressed in the Dinka word *dheeng.* (Deng, 1973:86) The strong commitment of the Dinka to preserve their tradition and culture as a way of confirming the existence of their ancestors and their contribution to the culture of their progeny, led some "observers" to describe them as conservative, resistant to change and proud. In this context Major Titherington (1949), who worked among Dinka under the Angelo-Egyptian Condominium, observed the following:

> One of the determinants of the rapid or slow spread of Christianity in the south has been provided by the contrast between semi-nomadic, cattle-breeding Nilotic tribes (Shilluk, Nuer and Dinka) and the settled agriculturists. The life of the former is bound up with a cow economy, this animal being a veritable god. They are intensely conservative and very proud of their civilization. They have acted as a bastion against the penetration of Islam by having proved impervious to its seduction. (Deng, 1973:87)

Audrey Butt (1952) also shared this opinion when he made the following observations about Nilotes:

> They consider their country the best in the world and everyone inferior to themselves. For this reason they.....scorn European and Arab culture.....Their attitude toward any authority that would coerce them is one touchiness, pride and reckless hatred of submission. The Nilote is ready to defend himself and his property from the inroads of others. They are self-reliant, brave fighters, turbulent and aggressive and they are extremely conservative in their aversion to innovation and interference. (Deng, 1973:87)

According to Deng (1973:90), the Nilotes" resistance to change, their cultural ethnocentrism and their isolation have been exaggerated enormously as they have been exposed to external influences for centuries and have assimilated some of the cultural elements they have adopted and become integral part of their culture. With modern education and increased cross-

cultural interaction, Nilotes have demonstrated a high degree of adaptability to change that was never predicted (Deng, ibid).

Economy Before the Current War

Before the current civil war, in 1983, the Dinka economy was based on animal husbandry, agriculture, fishing, trade and some dependence on wild foods. Labor migration in particular used to play an important role, particularly in northern Bahr el Ghazal as Dinka. With the introduction of money in Dinka economy in the 1960s and the 1970s a new pattern of labor migration particularly to southern Kordofan and southern Darfur, was encouraged. This labor migration fit into the cultivation pattern of the Dinkas; they finished their fields first and could take advantage of the later rains in Darfur and Kordofan. Besides its direct economic value, labor migration reduced the sale of cattle. Dinka and especially Nuer came to provide a significant proportion of the construction workers in Khartoum. Wage labor became a major means of earning money and source for acquiring livestock and marriage.

The trading between south and north, although resented by southerners for apparent excessive exploitation, had greatly helped in providing the essential goods to various parts of southern Sudan. In times of famine, the *jellaba*, driven by profit maximization, would take all possible risks to rush grain to the affected areas. The famine in Torit in 1962, for example, was locally called *itular,* the name of the white grain brought by northern traders. This is a good example of north-south trading that had some positive role in addressing food shortages. Another example is from Abyei. When acute shortage of food was experienced in 1966, the year became locally known as *runrakieb* (year of bread) as people were rescued mainly by purchasing bread from the market.

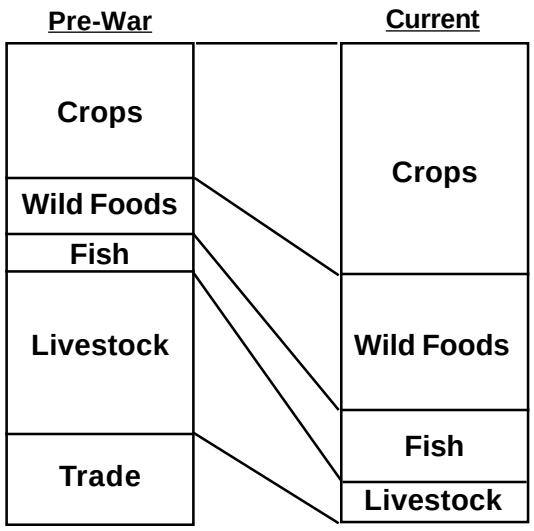
Current Economy During the War

The World Food Program in conjunction with SCF (UK) used the food economy approach to assess the adaptive strategies people choose during war (Figure 1). According to FEWS (1997:5), the civil conflict has curtailed trade, and households can no longer rely on markets for their food. With their herds destroyed by raiding, local residents have increased their reliance on fishing, wild foods, and crops (FEWS, 1997:5).

In illustrating this drastic change in people's food strategies, a rough estimate of the magnitude of the strategic choices made by residents in one county in northern Bahr el Ghazal region is shown in Figure 1.

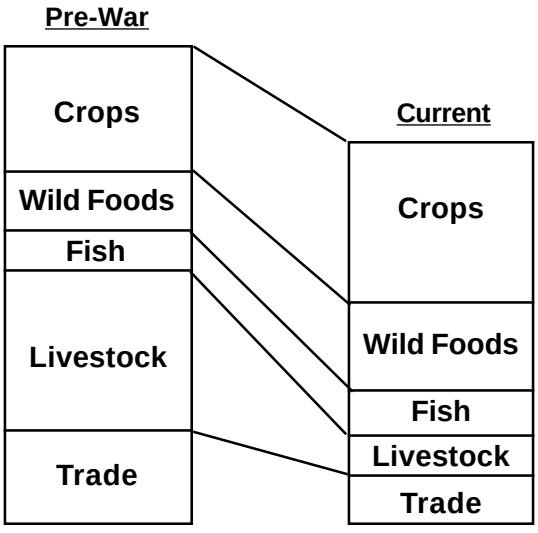
Although Figure 1 is a rough gauge of strategic choices made by people, it shows a general trend in the effects of war on people's access to food. However, the food economy methodology has underestimated the role of markets during war, which has greatly limited its monitoring and predictive feature. Also, the shift in risk toward natural shocks and insecurity during

Figure 1: Effect of War on People's Food Choices



Source: WFP/SCR/FEWS/USAID

Figure 2: Effects of Drought and Food Insecurity



Source: SRRA Monitoring Unit

the current civil war has generally reduced the average household's level of consumption. As a result, Figure 1 is adjusted to reflect the effects of the shift in the risks associated with drought and insecurity on level of consumption as shown in Figure 2.

To elaborate more on the general trend of the strategic choices made by residents in Bahr el Ghazal, as illustrated in Figure 2, each strategic options is treated separately.

Crop Production

Before the current civil war, the resident population became too dependent on the markets in accessing grain, particularly after considerable trade integration between north and south. The *jellaba*, together with other southern traders, used to bring grains from northern Sudan at relatively lower prices. The monetization of the Dinka economy and increased opportunities for labor wages allowed them to become dependent on bought grain and greatly reduced reliance on their own food production. However, there were some exceptions as some farmers, particularly in the Abyei and Awiel areas, increased their cultivated acreage considerably in response to the increased demand for grain in the major towns due to the increased civil servant population.

During war and as a result of limited trading activities between north and south, limited labor migration, drastic depletion of livestock through raids and lack of wage labor and employment opportunities, the residents become increasing reliant on their own food production (*direct entitlement)*. The area cultivated increased considerably from almost one feddans (acre) before the current civil war to more than 1.5 feddans for an average household in most counties of Bahr el Ghazal. Recently with increased counterinsurgency warfare in northern Bahr el Ghazal particularly in the Abyei area people resorted to using moonlight for sowing and cultivation and adopted innovative storage system so as to avoid raids and attacks by the Government of Sudan's (GOS) Popular Defense Forces (PDF). In most counties of Bahr el Ghazal the resident population have shown a remarkable adoption of ox-plow for cultivation, which used to be a taboo because of special respect to livestock before war. Crop production, unlike before the war, has now become a source for buying cattle and even marriage.

Wild Foods

Before the current civil war, the role of wild foods was reducing its importance because of monetization of the Dinka economy, wage labor and modernization as a result of education, which tended to disassociate children from their tradition and culture. During the 1950s and the early 1960s, education was largely woven around people's life and culture with well-balanced reconciliation between modernization and tradition. The traditional life cycle of Dinka is a continuous process of acquiring, experiencing, possessing and sharing of traditional knowledge and values. Traditionally, wild foods play an important role in Dinka life not only during famine, but also in normal times. The Dinka interaction with their environment particularly physical environment starts at an early age as small boys spend most of their tending cattle in pastures and forests, from which they get most of their snacks from the environment. Also girls accompany their mothers during wild foods collection and firewood in the nearby forest. The Dinka relationship with their environment was greatly affected in the 1970s and the 1980s as a result of intensive cross-cultural interaction, drastic monetization of local economies and modern education, which disguised local traditions and cultures. While the British colonial policies kept tribes isolated and tried to preserve traditional cultures, the successive post-independence national governments in the Sudan have been consistently adopting policies of ethnic cleansing and assimilation, which resulted in the suffering of traditional African cultures.

The war has paradoxically resurrected and renewed the traditional relationship between the Dinka and their environment because of necessity and limited options available for survival. The importance of wild foods during the war has been recognized and the need to preserve local knowledge of them has become a priority. During the famine of 1998 in Bahr el Ghazal, wild foods contributed more than any other food sources, including relief food, in saving the lives of a large number of famine victims because of its easy availability and affordability. The importance of wild foods in Dinka life is now conspicuous in contemporary

songs. One Dinka poet called Atiam Thon in Gogrial County, in lamenting how the abandoning of Dinka tradition, particularly their reliance on wild food, and increasing reliance on town life has made them increasingly vulnerable to famine, said the following:

You our people
You have abandoned the collection of weeds (wild foods)
Let me show you these weeds
Dig (agony) into the rocky land
Add also apam...and also beleak...And tree called aneet
Thou is put in water and then eaten and tastes like bitter and sweet as well;
That is what is called survival
Then cuei is also soaked ...and kei is up-rooted
Ajuet is pounded and akuatha also
And also aruaja are uprooted....whatever warms the mouth
All these have been abandoned by Monyjang (Dinka);
And they turned their lives to towns.
Now you see with your eyes,
And hear with your ears,
The land has come to an end.

Also it is apparent that naming famines after some of the wild foods was so common after the current civil war, particularly the famine in Yirol in 1985, which was called *nyok*; the famine in 1988 in Rumbek, which was called *apat*; and the famine in 1986 in Bor, which was called *apat*. This clearly shows the important role played by wild foods during the current civil war as the most attainable coping mechanism. Some wild foods, which are available and collected by the Dinka during normal and bad times in Bahr el Ghazal, are summarized in Table 1.

By comparing the various types of wild foods with sorghum/millet, which has about 326 kilocalories/100 grams, it becomes clear the nutritional value associated with these wild foods. The months of collection also indicate that these wild foods are available throughout various seasons particularly during the rainy season when the stock of harvested sorghum is at its lowest (May to August). Interestingly, the community perception of the various types of wild food does not conform to their nutritional values. For example, communities perceive *ajuet*, which has about 580 kilocalories/100 grams, as a distress food. This difference between community perception of wild foods and their nutritional value is extremely important in early warning systems. The community perception of various wild foods also varies from area to area and group to group. In certain areas one type of wild food is perceived as normal and in other areas a similar type of wild food is considered to be a distress food or is not at all eaten.

Despite apparent advantages associated with wild foods, there are considerable costs, risks and side effects associated with their consumption as when people started consuming excessively wild foods during the current famine. The frequency and intensity of the wild foods consumption and their processing and preparation determine the level of toxic component, which has immediate and long effect on people's health. For example, when, in 1998, the communities at Lopit in eastern Equatoria was faced with severe food shortage, members of that community became increasingly dependent on one type of wild food called *amalwa* (famine wild foods). Normally, *amalwa* must be cooked about six to seven hours before it becomes suitable for consumption. However, during the 1998 famine, people were forced to shorten the period of cooking which resulted in poisoning and subsequent death of three people.

Also, intensity of usage and poor processing of normal wild food, such as wild yams, have resulted in the deaths of more than 21 persons in Imehejek village and five persons in Lohutok village because of high level of poison which was suspected first to be cholera. In Lalanga village, about 141 residents were affected in April 1998 by poison related to poor processing and intensity of consumption of wild yams. This resulted in about 119 patients being treated in May 1998 at the health center, 11 patients died and about 21 patients were under close medical supervision in the health unit.

Livestock

Before the current civil war livestock was the mainstay of the Dinka economy. During the era of strong native administration under Anglo-Egyptian rule and the relative peace after Addis Ababa Agreement in 1972, during Nimeri's regime, the Dinka managed to restock considerably because of improved veterinary services. The improved employment opportunities with the regional government in the southern Sudan and wage labor opportunities in northern Sudan reduced the demand for the excessive sale of livestock and, instead,

Table 1: Sample of Types of Wild Foods Collected in Bahr el Ghazal, 1998

Local Name (Dinka)*	Community Perception (Year of collection)	Description and/or Scientific Name*	Kilocalories per 100grams*	Months of Collection
Seeds/Kernels				
Akuedha	Normal	Mixed grass seed	391	August–Sept
Amijuong	Distress	Mixed grass seed	370	Feb–April
Gor	Distress	Nymphaea sp.	380	March–April
Akondok	Normal	Boscia senegalensis	150	April
Cuei	Distress	Tamarindus indica	380	Feb–April
Thou	Normal	Balanites aegyptiaca	567	Dec–Feb
Ajuet	Distress	Caparis sp.	581?	April–May
Akon	Distress	Parkia bigloboso	499	March–April
Tubers/Roots				
Ngaana	Distress	Discorea sp.	300	July–August
Touk	Normal	Borrassus aethiopicum	213	April–July
Fruit/Berry				
Dhiot (fresh)	Normal	Nauclea latifolia	59	Nov–December
Dhiot (cake)	Normal	Nauclea latifolia	303	Nov–December
Cum (fresh)	Normal	Diospyros mespiliform	125	Nov–January
Cuei (dry)	Normal	Tamarindus indica	250	Feb–April
Lang (dry)	Normal	Ziziphus sp.	300	Nov–January
Ngap	Distress	Ficus sycomorous	56	July
Oil				
Raak	Normal		895	May–June

* Indicates that information originates from independent research under the auspices of SCF/WFP.

Source: SRRA

increased the population growth of the livestock. The public servants in the regional government who had their education in the 1950s and the 1960s had special admiration and affection for cattle and invested a large portion of their savings in acquisition of livestock. Though the life of the Dinka was not was bound up with a cow economy, livestock before the current civil war became the core of their identity.

During the current civil war, livestock became the source of Dinka misery and increased vulnerability as they were targeted by the counterinsurgency warfare. According to Keen (1994:19), it was precisely the Dinka's resources that made them vulnerable to exploitative processes that threatened to destroy their way of life and remove their assets. The Dinka became increasingly exposed to famines not because of their poverty but rather because of their livestock and their land as well. It is estimated that in northern Bahr el Ghazal at least 40 percent of all households have entirely lost their cattle as a result of continuous raids for the last five years. Despite improved veterinary services, cattle rustling and raiding, the restricted movement of cattle during the drought in 1997, and distress slaughtering during famine in 1998 all resulted in a drastic decline in the population of livestock.

Despite increased incidents of counterinsurgency warfare, off-taking, cattle rustling and raids, some cattle owners have a wide range of strategies to mitigate the effects of these incidents. Some cattle owners diversified the increased risk by scattering cattle into various cattle camps or entrusting them to various individuals and remaining with small herds. Some cattle owners now prefer to invest in social relationships by marrying into various families and to subsequently to reduce the herds to a manageable number. Other cattle owners abandoned agricultural activities entirely and

become pure pastoralists with an effective, early information system to alert them to potential raids. This group is an extremely high risk-taking group and depends entirely on local markets to acquire grain. Other groups decided to migrate southwards to Tonj and Rumbek counties, which are relatively peaceful.

Trade and Exchange

There is no doubt that during the 1960s and the 1970s there was considerable expansion in trading activities between southern and northern Sudan. This process was also accompanied by the expansion of the public sector with the establishment of a regional government in southern Sudan, which created huge demand for modern goods, which could only be obtained from northern Sudan. Besides massive employment opportunities offered to war veterans and returnees from the neighboring countries, the private sector, particularly agricultural schemes and construction in northern Sudan, found the southern Sudanese laborers cheaper and more loyal. These factors encouraged the proliferation of a number of northern traders particularly the less efficient ones in various parts of southern Sudan. Due to the oligopolistic structure of the trading industry, which came into being as northern traders established strong networks to control local markets, indigenous southern entrepreneurial initiatives suffered a great deal in such highly competitive environment. Though the southern regional authorities started to support some indigenous entrepreneurial initiatives, these initiatives were buried at early stage as they became spoiled with excessive favoritism and became corrupt and inefficient.

During the current civil war, particularly in the 1980s when the war reached most parts of southern Sudan, free trade and movements to and from the areas of fighting became limited. With gradual growth of the local markets in the areas under the SPLA during the 1990s, there was considerable proliferation of main markets with satellite markets in most parts of the region. These main markets encouraged gradual interaction between the traders in the SPLA and the GOS, and various fighting parties were convinced to allow free movement of traders. For example, in Awiel East County there is one main market called Warawar, which is the largest market in Bahr el Ghazal. Northern traders brought essential goods here to exchange for cattle and the SPLA provided security and to ensure free trading. This market supplies most markets in Bahr el Ghazal. The participants of Warawar market, particularly Dinka and Arab traders, moved beyond trading to peace initiatives and formed a peace committee to resolve low-level conflict. For example, in 1996, the market was attacked by the PDF, which burned all shops, looted goods and livestock, killed people and abducted 29 children for slavery and forced labor. The Arab traders who were in the market during the attack took refuge with the Dinka and were protected by the SPLA from some grieving Dinka families whose children were abducted or had members of their family killed by the Arab PDF. The market peace committee decided to send its Arab members to bring back the abducted children. They managed to bring all the children back except one. Both parties encourage the trading activities between the Government-held towns, particularly Wau, Gogrial and Abyei, and the areas controlled by the SPLA. These market activities helped a great deal during the current famine, particularly the Warawar market and the GOS-held town of Abyei, where people managed to buy grains.

There is also trading activity between Bahr el Ghazal and Uganda via western Equatoria with Dinka traders traveling more than 100 miles to and from the northern Uganda border town of Arua. Dinka, particularly from Rumbek and Yirol, move with cattle to Uganda and then come back carrying on their heads secondhand clothes and medicine. Besides these trading activities, there are also opportunities for labor employment within the region, particularly in Lou (Jur) and Bongo communities.

Early Warning System

The SRRA Monitoring Unit recognized since its inception in 1995 the importance of IWFPs and incorporated their characteristics in its early warning system. The Unit has managed to compile various types and characteristics of IWFPs in almost 17 counties of the New Sudan particularly in Bahr el Ghazal, Upper Nile and Equatoria. These characteristics include their performance, availability, yield, months of collection, members of family involved in collection, prices and community perceptions. The monitoring of the IWFPs helps not only in assessing their availability but also help as early indicator of distress.

Discussion/Comments from the Floor

1. A comment was made about death resulting from eating yams, highlighting the importance of knowing how to prepare foods.

2. Education is essential to ensure that the dangers of wild and poisonous foods are known. Most people who are poisoned are not familiar with the foods or their preparation, i.e. they lack the local knowledge surrounding the food. The speaker added that displaced people are at particular risk because they are out of touch with the environment that makes eating wild foods necessary. They have often regarded wild foods as "uncivilized."

3. Three or four malok-producing trees could contribute substantially to nutritional status in terms of kilocalories. The commentator compared this with nutrition provided by food drops. The speaker referred to Table 1 of his handout.

Paper 3

Nutritional Contribution of IWFPs

Birgitta Grosskinsky, CRS

The participants were asked to name a cultivated and IWFP for each food type. These names are listed in the table below along with their scientific names. **(**Appendix 1 gives a complete list of food plants found in southern Sudan with the scientific and vernacular names from different regions.)

Table 1 shows that IWFPs cover a wide variety of food types. In fact, there are more wild varieties than cultivated; therefore, wild foods are an important contribution to balancing the diet. In this regard, they compare favorably with domesticated plants. A balanced diet is one which fully meets all the nutritional needs of a person. It is made up of a combination of carbohydrates, fats, proteins, micro-nutrients and water.

It is important to note that various nutrients are known to interact with one another within the body. Therefore dietary diversity will increase the likelihood that all nutrients are included which will optimize the potential of these foods and ensure a balanced diet. One of the most common causes for dietary deficiencies and food insecurity appears to be the decreasing diversity of traditional diets.

The findings from a nutritional assessment carried out in South Sudan last year showed that many people had a calorie deficiency, but were not suffering from micro-nutrient deficiencies.

> It comes as no surprise to anyone presently familiar with the Bahr el Ghazal region of southern Sudan that the current nutritional status of much of the population is characterized as marasmic, calorie-deficient malnutrition. What may at first seem to be surprising is that health workers at PHCU and at selective feeding centers have not reported instances of other types of nutrition deficiencies such as scurvy, vitamin A deficiency, pellagra, severe iron anemia or goiter.
>
> Based on the consultant's discussions with the female heads of households and reference materials providing nutrient data on the wild foods collected and consumed, it seems entirely reasonable to conclude that nutrient deficiencies have not been seen or precipitated due to the presence of needed nutrients in sufficient or cumulatively acquired levels from the wild foods. The wild foods consumed during these recent times of severe food shortage and resultant hunger (energy malnutrition) have provided adequate

Table 1: List of Cultivated and Indigenous Foods

Food types	Cultivated example	Indigenous example	Scientific name
Fruits	Orange, bananas	Cum,Elumi Konjuk, Konjuki, Yuola, Mony chol	*Diospyros mespiliformis* *Vitex sp.*
Leafy greens	Cabbage	Lung/Anuer, Anuar, Wor, Sere sere	*Portulaca sp.*
Non-leafy vegetables	Tomatoes, cucumbers	Kwol Jok	*Cucumis sp.*
Cereals/Grains	Sorghum, maze	Aquadha	Mixed Graminaceae
Nuts/Kernels	Groundnut	Thou apam, Thoa, Thau, Eduti	*Balanites aegyptiaca*
Roots/Tubers	Sweet potatoes	Aboye, Baniongo	*Discorea sp.*
Oil seeds	Simsim, sunflower	Rak, Enguroti	*Butyrospermum paradoxum*
Pulse	Red beans, lentils	Aquem li	
Others (gum, flowers, bark, etc.)		Adok, Aguat Apiaath	*Acacia sp.*

> micro- and macro-nutrients to ensure that once the intake levels of energy were sufficient, energy metabolism was not compromised by a deficiency of requisite enzymes (i.e., vitamins). (Hudacek, A. "Nutritional Assessment Mission South Sudan." EMOP 5826.01 WFP. Nov. 1998, p.13)

Interestingly, it has been demonstrated that more stable populations in other countries, which have become dependent on imported cereals, show a preference for introduced vegetables with lower nutrient quality. As consumption of fruit and leafy vegetables decline, the consequent reduction in vitamins and minerals results in nutritional deficiency disorders. (Fleuret, 1979; Truscott, 1986)

Aside from times of food deficits, there are many other factors which influence people's ability to meet all of their nutritional needs: personal tastes, tribal and social taboos, availability, seasonality, social and economic constraints, education, etc. These all play a role in people's perceptions and behavior with regard to certain types of food. In spite of the fact that many varieties and species of wild foods are gathered and consumed regularly, their role in the diet is generally believed to be of little importance. There has been, however, a lot of documentation on the nutritional properties of edible plants. (Goode, 1989: Campbell, 1986b; Ogle and Grivetti, 1985; Dirar, 1984; Gura, 1986; Malaisse and Parent, 1985)

Preparation Methods which Maximize Nutritional Potential

Apart from the quantity of different nutrients provided through a certain diet, bio-availability is an important factor, e.g., many vitamins and minerals (particularly calcium and iron) are only available in a bound form. This bio-availability requires either a certain method of preparation or a certain combination with other foods to make them available for the human body.

It seems that some traditional cooking methods are good and others are not so beneficial for exploiting the available nutrients. There are also meal preparations, which increase the nutritional potential, e.g., grinding cereals, fermenting and malting, or cooking different combinations of foods together. Methods such as frying increases the fat content of the meal and the use of iron cooking pots and utensils contributes iron to the diet. There are also preparations which may have detrimental affects on nutrients. Vitamin A, for example, is reduced by sun drying, boiling for a long time without a lid on the pan, and frying at high temperatures. Cooking at high temperatures can spoil fats and proteins. Foliate decreases during cooking and storage. Vitamin C is easily dissolved in water and destroyed by heat. If leaves are picked just prior to cooking, provided the cooking process doesn't take too long there should be some residual vitamin C, though probably the greatest source is raw fruits (see box below).

Tallantire and Goode (1975) cite an investigation carried out in collaboration with Dr. W. Stafford of the Biochemistry Department at Makerere University in Uganda to determine the loss of vitamin C occurring during traditional methods of cooking. This entailed cutting up *Amaranthus* and boiling it for more than 10 minutes, or boiling whole leaves for more than 25 minutes this resulted in considerable loss of vitamin C. Boiling whole leaves for 4 minutes proved to be the best boiling method, particularly if the cooking water was then used to make the sauce. The best method of cooking the vegetable and preserving the vitamin content was to steam them with the staple food for 15 minutes.

Malting

A small quantity of germinated grain flour is mixed with porridge and heated slowly the enzymes dissolve the starch in the porridge, which reduces it to liquid in a matter of minutes. This porridge is not only easy to eat but it is also partly pre-digested making nutrients available for easy absorption, ideal for weaning foods and convalescent foods.

Fermentation

Fermentation changes food and makes it more digestible. The micro-organisms that cause fermentation provide a supplementary food and add variety to the diet. The micro-organisms are needed to make the digestive system function properly. In Sudan, fermenting cereals preserve and give a sour flavor which is particularly enjoyed. The process upgrades a grain's taste and nutritive value. It is inexpensive, requires no heating and is fuel-efficient. Fermenting reduces the viscosity of porridges. It raises the levels and bio-availability of proteins, vitamins and minerals. It enriches the foods through the synthesis of some B vitamins and adds flavor. It also helps protect food from diarrhea-causing micro-organisms. Sour porridges fulfill

many of the requirements of weaning foods and also reduce the risk of pathogenic diarrhea, Africa's leading cause of infant death.

Comparison of the Nutritional Value of IWFPs with Domesticated Crops

Many indigenous food plants are comparable or even have a higher nutritional value than domesticated crops. (See Appendices 2 and 3).

Macro-nutrients

Protein

The protein content of leaves was found by Ogle and Grivetti (1985) to average around 4 percent to 13 percent. (Malaisse and Parent, 1985) Their analysis of the protein of indigenous vegetables such as *Corchorus sp., Amaranthus sp.* and *Gynandropis gynandra* found that approximately 25 percent is lysine, which is absent in some cereals such as maize. The consumption of these plants with maize should balance the deficient nutrient. The fermented leaves of *Senna obtusifolia* has a crude protein content of 22.1 percent and are used as a meat substitute in northern Sudan called "kawal." (Dirar, H., 1984).

Campbell-Platt (1980) found that *Parkia sp.* seeds in northern and western Africa, once fermented, had a protein content of between 26 and 47g/100g and the caloric value ranged from 517-618 kcal. These seeds (vernacular "akon") are also consumed in various regions of southern Sudan and are well-liked, along with other such nutritious kernels as *Balanites aegyptiaca*, 25.7g/100g; *Sclerocarya birrea*, 23.5g/100g; and *Boscia senegalensis*, 24g/100g. (Gullick, 1997 field work)

The protein content of indigenous roots collected in southern Sudan average between 3 to 10 percent. "Bayungumba" (Zande) and "Bangiongo" (Zande – *Discorea sp.*) were found to have the highest protein content of all the samples analyzed (Grosskinsky, 1998 field work).

Lipids

Fat and oils improve provide more calories/gram than any other nutrient and allow for the absorption of vitamins A, D and E. Many of the wild fruits contain kernels which are rich in lipids and from which substantial quantities of oil can be extracted for cooking purposes. The high fat foods are particularly important for children who need the energy-dense foods for growth.

Carbohydrates

Wild grains, seeds and kernels provide significant amounts of calories, protein and oil. Much has been written about the nutritional value of the grass grains (BOSTID 1996). Their calorific value is frequently greater than that of the cultivated varieties and they tend to be more balanced cereals when the overall nutritional value is taken into consideration. The results of the analysis of the grass grains from the research area are impressive with a range of 310 to 391 kcal. (Gullick, 1997 field work) The most commonly eaten kernel in southern Sudan is the *Balanites aegyptiaca*, which has a calorific range of 514 kcal/100g to 567 kcal/100g (Malaisse, 1985 and Gullick, 1997 field work). *Sclerocarya birrea* a kernel eaten only during times of food shortage has a calorific value of 586 kcal/100g and protein value of 31.2g. (Malaisse, 1985) As can be seen these values are high. Interestingly, the kernel of *Sclerocarya birrea* is considered a sweet nut in southern Africa and is much in demand during non-food deficit times.

Roots and tubers are an important source for carbohydrates as well. The roots of *Discorea sp.* contains up to 90 percent carbohydrates and the tuber of *Amorphohalus sp.* up to 85 percent carbohydrates. (Grosskinsky, 1998 field work) These values are given on dry bases.

Micro-nutrients

Ash

The ash content of a food indicates its mineral content. Wild leaves have been shown to have a relatively high mineral content in comparison to exotic vegetables. Likewise they found that the ash content of five wild grains and two types of seed analyzed all contained higher quantities than cultivated grains.

Vitamin C

Fruits, leaves and tubers, particularly those consumed raw, all contain vitamin C; a lack of this vitamin can cause scurvy. To give an example of the vitamin content of wild fruits an orange, which has approximately 57 mg/ 100g, can be compared to *Adansonia digitata* fruit's 360mg/100g, and 1000mg/100g found in *Ziziphus sp.* When people become ill in southern Sudan it is a common practice to increase consumption of

fruits or fruit juices such as *Tamarindus indica*, *Ziziphus sp*. or *Borrasus aethiopicum.* These fruits they believe help them recover and all tend to be rich in vitamin C.

Vitamin C helps the body to use calcium, to absorb non-hema iron (derived from plants, eggs and milk) and destroys free radicals. Interestingly scurvy does not normally appear in breast feeding infants, which is said to be because their intake of ascorbic acid from mother's milk is normally three times higher than that of infants fed a similar amount of other milks. (KENGO, 1988) Certainly in southern Sudan this highlights the importance of the older children bringing fresh fruit back to the home for the rest of the family, particularly for the weanlings. Tubers also contain significant amounts of vitamin C, though by the time they have gone through the preparation process it is unlikely that there is much residual vitamin. Those that are eaten raw, however, should be good sources of the vitamin.

Vitamin A

Yellow, orange and red fruits such as *Diospyros mespiliformis*, *Balanites aegyptiaca*, and *Borassus aethiopicum* are rich in vitamin A. There are very few domesticated fruit trees in Northern Bahr el Ghazal save for a few mangoes. Therefore all the fruits come from wild tree, shrub and vine species. Low vitamin A intake causes one of the commonest and more serious deficiencies, which can result in blindness. In order to absorb the vitamin the body needs fats, thus a low fat diet can contribute to a deficiency. Fatty kernels and oil seeds in addition to fruits will ensure that the vitamin is digested. The vitamin can be stored up to six months in the body, so it is possible to stock up when it is available. Vitamin A deficiency is rare amongst the Dinka, even during times of food scarcity.

Iron

Iron is needed for the production of hemoglobin. Iron deficiency is the most common cause of anemia. Many of the wild leaves, such as *Gynandropis gynandra,* are rich in iron and have a higher content than the cultivated varieties. KENGO (1988) reports *Tamarindus indica* as having a high iron content of up to 6.2mg/100g. Ogle and Grivetti (1985) give a range of 4.2mg/100g to 45.6mg/100g. Fermenting and germinating destroys some substances, which prevent iron absorption. It is not known whether eating leafy greens increases or decreases the amount of iron absorbed though they often contain substantial quantities of iron and vitamin C, but they may also contain anti-nutrients (polyphenols) which decrease iron absorption.

Potassium, Calcium, Phosphorus and Zinc

Potassium levels tend to be high in all leafy vegetables and fruits. Highest sources of calcium are leaves and milk. Vitamins are needed to help the body to absorb calcium. Phosphorus helps in protein assimilation in the body. *Amaranthus sp.* and *Gynandropis gynandra* both contain higher quantities of calcium and phosphorus than cabbage in the analysis carried out by Kengo. Both calcium and phosphorus are needed for skeletal development and clotting of the blood. They are particularly important for pregnant and lactating mothers. Zinc can be found in good quantities in grass grains.

Vitamin B Complex

Vitamin B_2 or riboflavin deficiency is responsible for several eye and skin disorders. Campbell-Platt (1980) noted that this deficiency is a common problem throughout Africa. Leaves are a good source of this vitamin. Caldwell (1972) found that wild leaf vegetables had significantly higher riboflavin contents than cultivated varieties. The content found in leafy vegetables are higher than those for eggs, milk, nuts and fish. Vitamin B1, thiamine, helps the body burn nutrients to release energy. A deficiency will cause beriberi, which can be found in people living on starchy tuber or polished rice diet. Oil seeds and grass grains are good sources of the vitamin. Niacin deficiency "pellagra" can be found if people only eat a poor diet.

Anti-Nutrients and Toxins

To be able to judge the nutritional value of indigenous food plants it is also necessary to have information about the anti-nutrients. Some of the food plants can cause health problems. Many of the bitter vegetables (e.g. the leaves of *Balanites aegyptiaca*, fruits and some roots) contain alkaloids, which effect the central nervous system. Therefore the preparation of IWFPs is very important, because some of these foods are poisonous. Some have to be soaked in water and cooked for a long time or certain herbs need to be added when they are cooked to remove the toxin content. Different types of toxic components are mentioned below.

Anti-nutrients are substances such as poison, which are toxic to or interfere with the digestion and absorption of nutrients. Boiling, soaking and roasting removes anti-nutrients. Many famine foods especially tubers

are poisonous unless properly prepared. It is reported that during times of wide-spread famine the old people of the Moru in South Sudan and the Massa and Mussey in Cameroon would eat the potentially toxic food first. If it is all right and clear from poison the children will then be given some. (Sharland, 1989; de Garine and Koppert, 1988). Raw *Boscia senegalensis* is toxic and needs to be soaked in water for a couple of days to be edible. One migrant family arriving in el Fasher in northern Sudan lost three children to poisoning. (de Waal, 1989)

In discussion with women in Akon in northern Bhar el Ghazal, who were preparing "akudo," which is a mix of grains swept from the ground or extracted from termite mounds, it was said that sometimes when they ate the "asida" or "kisera" made from the grass grains it would make them light-headed for half an hour or so. This may be attributed to the fact that when ants collect seeds they are all mixed together. Due to the similarity in size it is not always possible to separate the different types of seed and some of them may be from other species of plants which may have a light toxic effect. (Gullick 1997, field work)

Oxalate

Both wild and domesticated plants may contain various factors, which could interfere with the absorption of nutrients; oxalic acid is one such factor. When combined with calcium and phosphorus, oxalic acid forms insoluble crystals that will inhibit the absorption of the two minerals. The acid may also irritate the throat if it is present in high enough quantities. Ogle and Grivetti (1985) write, however, that in a balanced diet, greens used in moderation, should not adversely affect the bio-availability of nutrients. They are found in the wild leaves at a non-toxic level and are therefore not considered to be a nutritional risk.

Tannins

Tannins are found in leafy greens and cereals. They are a complex protein which is not available to the body. Some tannins inhibit enzymes like trypsin so that they don't carry out the digestive function. They will also prevent the absorption of iron. The lethal level is 2 percent wild leaves usually contain less than 2 percent e.g. the tannin content of *Amaranthus lividus* is 74.0mg/100g, *Gynandropsis gynandra,* 80.2mg/100g, *Cucurbita ssp,* 73.0mg/100g and *Chorchorus olitorus* 34.9mg/100g. These levels indicate that they do not pose a health risk. (KENGO, 1988).

Aflatoxin

Aflatoxin mold grows on legumes and cereals which haven't been properly dried or are stored in a damp place. The ingestion of the mold will make a person very sick and can cause liver cancer if eaten over a long period of time

Cyanide

The toxin cyanide found in tubers is extremely dangerous, although people only tend to die from it if they eat the tuber raw or if they are very sick and eat it semi-cooked. The toxin will however prevent the absorption of iodine, which leads to the disease goiter.

Cucurbitacins

Njoroge and Newton (1994) found that 16 of the 23 *Cucurbitaceae* reportedly used for consumption by local communities had toxic cucurbitacins. It was recommended that they be avoided as their consumption can lead to illness or even death. This is a very difficult family of plants to identify; some authors may list a certain variety as being edible and other authors may list the same variety as being poisonous.

Conclusions

Tothil, in his paper on "The Problem of Nutrition and Tribal Diet," comments that there are many minor foods and flavorings used by Sudanese tribes which have not been analyzed and the vitamin content is unknown. In this list there are wild fruits and wild herbs used as a salad or vegetable or flavoring. He goes on to say that "it is possible that some of the deficiencies indicated by examination of the value of the main foods in any particular area may be made good by the use of some of these minor foods or flavorings." Even today little analysis has been carried out on these so called "minor foods" in southern Sudan, though significant analysis has been undertaken of the same species in other African countries. It is known that food analyses in one place may well have a different nutritional profile to the same food collected from a different area. On the other hand it can be used as an nutritional indicator of the potential of a species and provide a range of possible values although ideally it would be better to have more accurate information from the areas being studied.

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Discussion/Comments from the Floor

1. There is a need for nutritional analyses of food specimens to determine how much nutritional value is lost during processing and to determine the affect of processing on toxins and anti-nutrients.
   Response: Some tests and analyses have been carried out on samples, which were prepared by local people. Some were carried out in the raw stage. In general specimens are analyzed in the condition in which they are consumed, i.e., cooked, raw, dried, etc. because that is how they contribute to the diet.

2. People have traditional ways of preparing foods to ensure that they are harmless when consumed, but the methods vary among communities. It would be good to carry out a study to examine preparation methods in normal (non-famine) times, with a view to determining the best method(s).

3. *Question:* Are there ways of identifying or grouping plants with toxins?
   Response: Some plant families are known to contain certain toxins, but in other families the toxins cannot be categorized. Information on the toxic components has been only gathered from secondary sources. Analyses of anti-nutrients will be carried out, but the samples are normally analyses in their prepared stage by which time the toxins may no longer be present.

4. It is necessary to develop criteria on which identification of toxins can be based. It was also emphasized that there are ways of processing foods, which reduce toxins, e.g., exposing yams to sun to reduce cyanide and fermenting processes.

Paper 4

Case Study from Kenya on Indigenous Wild Vegetables

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Introduction

In Africa, we draw hope from the diversity of our plants and ways of using them for food. Unfortunately, this reservoir is threatened by negligence, insufficient knowledge and population growth which leads to destruction of habitat.

Edible wild vegetables play an important role in African agricultural and nutritional systems. They form a significant proportion of the diet for majority of the population who are either in low or middle income category.

Normally, there is interchange in usage of the terms traditional and indigenous vegetables. In this paper, I have mainly concentrated on the latter, but a few traditional vegetables have been included. Traditional vegetables have been taken to mean indigenous or introduced species of vegetables, which due to long use, has become part of the cultural diet of a community. These include: *Moringa oleifera* (drumstick, horseradish), *Cucumis ficifolious, Mannihot esculenta* (cassava), *Cucumis maxima* (pumpkin) and *Ipomoea batatas* (sweet potato). The leaves of *Ipomea batatas* are used as vegetables in traditional dishes. On the other hand, indigenous vegetables are those of local origin, in this case Kenya or Africa.

Indigenous vegetables range from herbs to trees. In Kenya, we have recorded about 69 species of indigenous leafy vegetables in 25 families. Most of these vegetables are treated as weeds in different parts of the country and even worldwide, and for this reason, they are not well-known, as there usage is local.

In traditional African culture, cultivation of vegetables was not an important practice. Nowadays, they either are cultivated in small patches in kitchen gardens or grow as weeds in marginal areas within farms or wild in forest areas. It is generally assumed that traditional vegetables are of a supplementary or emergency nature in the diet, but this is wrong, as they determine the intake of the carbohydrate staples while at the same time they combine essential nutrients. They supplement energy and nutrients obtained from other domesticated crops and play an important role in maintaining a nutritious diet during drought.

Role of Culture

Three factors determine the type of food eaten by a people. These are: what is available, what can be afforded and what an individual is accustomed to eating. Unfortunately, even with these factors in place, culture plays a big role in eating habits.

In Kenya, and in Africa in general, we have agricultural communities, pastoral communities and hunter-gatherers. The consumption of vegetables is less significant among the pastoral communities, but given recent trends in climatic changes (affecting the food production systems of the communities), pastoral communities are using leafy vegetables as part of their daily diets. Cultural disintegration and population increase has also had an impact on food production systems and availability leading to a search for alternative food resources other than those that are culturally accepted. Intermarriages and urbanization have led to people living together from different cultural backgrounds, thus creating a sort of exchange in eating habits. The change in eating habits is continuing as we also have displaced people living in refugee camps and depending on whatever food relief they can get.

Kenyan agriculturists who come from areas with high agricultural potential use very few of these vegetables. The common indigenous vegetables used in central Kenya are *Vigna unguiculata* (cowpea), *Urtica massaica* (stinging nettle), *Amaranthus*, *Erucastrum arabicum* and occasionally *Solanum nigrum* (black nightshade). The rest are considered weeds and majority are not known as they do not grow in these areas.

Some of the problems faced in trying to promote the utilization of other indigenous vegetables in these areas is the collection and preparation methods of the leaves, which are time consuming, and the bitter taste and sliminess of some of them. The communities in these areas have other time consuming agricultural activities, which include coffee and tea farming. Therefore, spending lengths of time picking and preparing these vegetables is a limitation to their activities. Thus, there is a need for further research on these vegetables to not only increase the leaf size and yield, but improve the palatability of some of them. Communities where these vegetables are widely used are found in western Kenya, on the coast, in parts of eastern region and in parts of the Rift Valley. These communities include one or more of these vegetables in their traditional dishes and even the bitter ones are sought for their bitterness. Processing is very important and varies depending on for whom the food is being prepared. In order to reduce bitterness, and especially when preparing them for children, the vegetables are blended with milk or groundnut sauce.

Potential Value of Indigenous Vegetables

The majority of Kenyans live below the poverty line. Few Kenyans can afford three meals a day and even if they were able to afford it, the food, in most cases, is unbalanced. This has led to a majority of the population in both rural areas and the slums of the urban areas being malnourished. Diseases caused by vitamin A deficiency, skin diseases and others are also prevalent. Fortunately, some of these problems can be alleviated to a certain degree, by use of these vegetables. Indigenous vegetables could fill a valuable niche in food production in the rural areas, particularly in low rainfall areas, as most are drought-resistant. This can be viewed in various ways. In Kenya (and in Africa in general), women are the producers and sellers of vegetables. By producing these vegetables, they are able to help meet the nutritional requirements of their families as well as have some income, which they use to buy other supplements for their families' diets.

Vegetables in Health Care

From the IFPP research done in Kenya, quite a number of vegetables were mentioned as contributing to the child and mother welfare, e.g., *Gynandropsis gynandra*, wild *Sesamum*, *Solanum nigrum* and others mentioned in the above table. Others were mentioned as general medicine, e.g., *Nymphaea nouchali*, *Oxygonum sinuatum*, etc.

Vegetables with Other Economic Values

Some vegetables have other values other than food values, e.g., *Corchorus* and *Adansonia digitata* produce fiber, *Adansonia* has edible fruits and medicinal usage. *Moringa oleifera* seeds are used in water purification.

Vegetables Used in Veterinary Medicine

Some have been mentioned as important source of veterinary medicine for livestock, e.g., *Launaea cornuta* and *Basella alba*.

Vegetables Associated with Cultural Beliefs

Some vegetables are associated with cultural beliefs. Some of the beliefs help in conservation and usage while others threaten the survival of the species, e.g., *Gynandropsis gynandra* (see above notes) is highly recommended for pregnant women and is almost mandatory for women to use it before and after childbirth in some communities. This helps in conservation and usage. On the other hand, *Vigna subterranea* (bambara groundnut) has a variety that produces black seeds. This is not preferred as it is said to bring evil spirits or spells.

Storage and Processing of Vegetables

In promoting the utilization of indigenous vegetables, it was important to include recipes and methods for preparing the food in order for it to succeed. Some of the bitter vegetables are thought to be unpleasant by the people who do not use them, but when prepared by those who have perfected the culinary usage over the years, may be found to be quite pleasant.

The indigenous vegetables are processed in various ways for storage. Some are sun dried when fresh, others are boiled or blanched, sun dried and stored for use during dry season. *Gynandropsis gynandra*, for example, is mixed with *Brassica carinata*, boiled, made into lumps, sun dried and stored in a clay pot as a dry season food by the Luo. The stored vegetable is then eaten with *Asystasia mysorensis* as "mboga."

Diversity and Traditional Uses of Indigenous Foods

Species	Family	Local Names	Usage	Medicinal usage	Other uses	Trad. Belief	Remarks
Adansonia digitata	Bombacaceae	baobab, dunydud, zuony, tebeldi	Young leaves are eaten as a vegetable.	Has several medicinal usages.	Fruit is edible. pulp of the fruit is soaked in water, stirred to a paste, and added to porridge. Fiber produced from bark.	The tree is considered sacred in most areas where it grows.	During war, people take refuge in the trunk of the tree for protection. The fruit shell is used in making local toys. The fruit is very rich in vitamin C.
Aerva lanata	Amaranthaceae	Eaten as a vegetable	Decoction of the leaves used for bathing babies suffering from malaria	Chicken food (Dig), white wool used for stuffing pillows (Tha)			
Amaranthus sp.	Amaranthaceae	amokading, amokatied, kuedekude, guet, amokatied, lissan el tair saghir, kabir, fiss el kalb	Eaten as a vegetable.	They are a popular choice for people during convalescence, especially during pregnancy and after delivery	Used for fodder. (See note below.)		Of the 60 or so species in the world, 13 have been reported to occur wild in Kenya. Some introduced for grain. This is the most commonly used traditional vegetable.
Asystasia gangetica & A. mysorensis	Acanthaceae	Used as a vegetable to blend with other vegetables.	Said to be good for digestion.				Mainly used for mixing with other leafy vegetables like corchorus, pumpkin leaves, cassava leaves, launaea cornuta, cowpea, okra & spider herb

Diversity and Traditional Uses of Indigenous Plants, continued							
Species	**Family**	**Local Names**	**Usage**	**Medicinal Usage**	**Other Uses**	**Trad. Beliefs**	**Remarks**
Balanites aegyptiaca	Balanitaceae	desert date, thou, apam, thoa, thau higlig, lalob	Young leaves and tender shoots are used as vegetables mainly by communities in the Rift Valley. Vegetable boiled, pounded then fried or fat added.		Seeds or cotyledons are boiled for 2-3 hrs.		
Balanites pedicellaris	Balanitaceae		Cotyledons washed, boiled for 8-9hrs with water changed 8-10 times. Salt or ash solution, tamarind, bark of *Sclerocarya birrea* may be added at the end of the process to get rid of the remaining bitterness.				
Balanites rotundifolia	Balanitaceae		Cotyledons boiled for 3-4 hrs and eaten with milk				Note: seed shells are removed by pounding or boiling then pounding
Basella alba	Basellaceae	Vine spinach	Leaves are soft and are usually cooked with other coarse vegetables.	Leaves used against constipation in animals and humans	Leaves given to cattle to increase milk.		

Diversity and Tradtional Use of Indigenous Plants, continued

Species	Family	Local Names	Usage	Medicinal Usage	Other Uses	Trad. Belief	Remarks
Borassus aethiopium	Palmae	akot, akan, agep, ruuk, tuuk, arook, taam, tuur, deleib	Germinating seedlings and immature seeds used as a non-leafy vegetable				
Boscia coriaceae	Capparaceae		Boiled cotyledons eaten .				Fruits pounded with stone to remove green outer fleshy coat, seeds then boiled briefly in water to loosen the tough white outer skin. This are then pressed between stones to remove the green cotyledons. Cotyledons boiled, water changed 8-12 times. Boiled cotyledon may be fried.
Brassica carinata	Cruciferae (Brassicaceae)	Ethiopian cabbage, Ethiopian mustard	An important vegetable, eaten separately or mixed with other veg.	Water obtained after boiling leaves is used to treat diarrhea	Oil from the seeds used in cooking and for skin care		Leaves are mixed with Gynandropsis gynandra, boiled, made into lumps, sun dried and stored in a clay pot as a dry season food. Believed to be a native of the Ethiopian highlands.
Citrullus lanatus	Cucurbitaceae	Local variety of watermelon	Fruit may be peeled and boiled with pumpkin leaves				
Coccinia grandis	Cucurbitaceae	scarlet or ivy gourd,malual, aluth?	Young leaves used as vegetables	Leaves mixed with ghee are used as medicine for pain on left side of stomach and paling of body in children	Fruit edible		

Diversity and Traditional Uses of Indigenous Foods, continued

Species	Family	Local Names	Usage	Medicinal Usage	Other Uses	Trad. Beliefs	Remarks
Commelina africana, C. forskaolii	Commelinaceae	newaso	Leaves are used as a vegetable	Stalks pounded, boiled and milk added for children's colds and coughs.	Used for fodder.		C. benghalensis is rarely used as a vegetable. Women used to advice their children against picking it as it is said to cause knee joint problems after prolonged use.
Corchorus olitorius, C. trilocularis	Tiliaceae	jute, bush okra, Jew's mallow, ayaak, ayitop, awengdeg, malok, kudera, molukhia, nyankajang, mara, udhing	Normally cooked with other coarse vegetables as it is slimy. In coastal communities, the leaves are pounded in a mortar, cooked with meat and spiced with lime or lemon juice.	Scrapings from root used to ease toothaches.	Bark is a source of the common commercial jute fiber that is cultivated in India and Bangladesh.		Sometimes it is cooked with cowpeas, milk and butter added and given to mothers who are breast feeding. It is said to aid lactation. Several Corchorus species are used as vegetables.
Crotalaria brevidens	Papilionaceae		Bitter, normally cooked with Corchorus species or milk used to reduce the bitterness.				Has poor foliage yield. used to spice other vegetables. Also used as a vegetable.
Digera muricata	Amaranthaceae		Leaves and young shoots used as vegetable.	Boiled root infusion given to mother after childbirth to			
Dobera glabra	Salvadoraceae		Cotyledons boiled for 3-4 hrs, water replaced 4-6 times, ash or a salt extract from a type of soil (ngeny) is added at the end of the process to improve the taste (PKT).	prevent fainting.			

Diversity and Traditional Uses of Indigenous Foods, continued

Species	Family	Local Names	Usage	Medicinal Usage	Other Uses	Trad. Belief	Remarks
Erucastrum arabicum	Brassicaceae	Leaves are used as a vegetable.					
Gynandropsis gynandra	Capparaceae	bastard mustard, spider herb, cat's whiskers, akiya, amokabek, kec nuom, tamaleka	Bitter leaves used as a vegetable. Sometimes milk is added and left overnight or groundnut sauce is added to reduce bitterness.	Vegetable is said to be a cure for constipation. Water obtained after boiling is used to treat diarrhea (Luo). Leaves are pounded with water and the extract drunk as treatment of "chira."[1] Patient also bathes in this.		See note below.	A dish prepared by adding butter to the boiled leave, eaten with finger millet "ugali" is served to important visitors like in-laws as a sign of respect.
Hydnora abyssinica	Hydnoraceae		Flesh of the flower bud (calyx) eaten raw.		The mealy underground fruit eaten raw.		
Hyphaena compressa	Palmae		Germinating seedling eaten.				
Ipomoea aquatica	Convovulaceae	water spinach, winter spinach	Leaves used as a vegetable.				
Ipomoea mombassana	Convovulaceae		Leaves used as a vegetable.				Can be a terrible weed.
Kedrostis pseudogijef	Cucurbitaceae		Young leaves and soft tip used as a vegetable; water used in boiling is normally poured off.		Fruits edible.	Plant used in a ritual before moving cattle to a new area.	

[1] Chira is a condition with symptoms like AIDS, but associated with curse or punishment from the spirits.

Diversity and Traditional Uses of Indigenous Foods, continued

Species	Family	Local Names	Usage	Medicinal Usage	Other Uses	Trad. Beliefs	Remarks
Lablab purpureus	Papilionaceae	dolichos bean, hyacinth bean	Leaves occasionally used as a vegetable.		Seeds eaten.		Good knowledge on preparation of the leaves needed. The seeds are used among the Kikuyu after childbirth.
Lageneria siceraria	Cucurbitaceae		Some varieties have young fruits that are used as a vegetable.				
Launaea cornuta	Compositae	Yeau, magak, moleita	Often cooked with other leafy vegetables like S. nigrum, A. gangetica.	Leaves given to children to protect them against lung disease (Kam)			An important vegetable among Giriama, often cooked during wedding ceremonies.
Leptadenia hastata	Asclepiadaceae	Akuor, nomloc, kuor Abu Leben	Cooked with other vegetables.	Sap from stems applied to wounds (Ng'ikebootok)			
Moringa oleifera	Moringaceae	moringo, drumstick tree, horseradish tree	Leaves and pod-like fruits used as a vegetable. Immature seeds used as green peas.	Roots used for stomach ache and infertility (Som [Man]).	Seeds used for purifying muddy water.		Native of northern India but cultivated in arid areas of the tropics. The young tender capsules (drumstick) are Asian delicacies. M. stenopetala is report-edly used same way as M. Oleifera in Mandera and in Ethiopia.
Mormodica rostrata	Cucurbitaceae		Young leaves and seeds eaten. Seeds sometimes roasted, leaves may be mashed with maize and beans.				

Diversity and Traditional Uses of Indigenous Foods, continued

Species	Family	Local Names	Usage	Medicinal Usage	Other Uses	Trad. Beliefs	Remarks
Mushrooms			Several species of mushrooms are edible and are used as non-leafy vegetables.	Some have medicinal value.	Some are known to be used in production of some dyes.		Rich in proteins and vitamins; unfortunately, the majority of people can not tell the edible species from the poisonous ones.
Nymphaea nouchali	Nymphaeaceae	water lily, gor, abeeth gor, kei, diany, agwi, tual, yil kiya	Flowers eaten in certain ceremonies of the Tugen while fruits and seeds are eaten by Pokot and Somali. (DIG).	Rhizomes are chopped with the flowers, mixed with honey and chewed as a remedy for kidney problems.	Ornamental uses.		Tuberous rhizomes are edible either fresh, boiled or roasted, normally used eaten with milk. Tuber also boiled until thick, maize or sorghum flour added and cooked together. Boiled tubers may be mashed, ghee added and eaten. Dried tubers ground into flour and stored. N. lotus used in same way.
Oxygonum sinuatum	Polygonaceae		Leaves used as a vegetable.	Leaves used against boils, stems chewed against tonsillitis. Juice squeezed from leaves used in eye treatment.			
Pentarrhinum insipidum	Asclepiadaceae		Leaves used as a vegetable.		Fruits edible.		
Portulaca oleraceae	Portulacaceae	purselane, pursley, purslane, lung, lum koor, chim yang, aliabdiang, rigila	Leaves and tender stems used as a vegetable. Leaves can be eaten raw.		Seeds are eaten or ground into a meal made into porridge. Used as salad and soup plant in some European countries.		Improved cultivars have been reported in Europe. Cultivated in France, Denmark and The Netherlands.

Diversity and Traditional Uses of Indigenous Foods, continued

Species	Family	Local Names	Usage	Medicinal Usage	Other Uses	Trad. Beliefs	Remarks
Sesamum calycinum var. angustifolium	Pedaliaceae	wild sesamum, nyuomweng	Leaves used as a vegetable; they are slimy, but normally mixed with other vegetables.	Used in treatment of stomach ache. Leaves ground and applied to scalp to prevent baldness. Leaves rubbed in water to produce a mucilage used for eye troubles and infant diarrhea. Mucilage used to treat burns and wounds. Oil from seeds used against ringworm.			
Sesamum orientale	Pedaliaceae	simsim, sesame, baniseed	Leaves used as a vegetable		Seeds produce edible oil.		
Solanum nigrum	Solanaceae	black nightshade, wonder berry	Leaves widely used as a vegetable	Leaves used against stomach ache. Leaves and fruits pounded, extract used against tonsillitis. Roots boiled in milk and given to children as tonic.			See notes below.
Urtica massaica	Urticaceae	stinging nettle	Leaves used as a vegetable mainly with mashed maize mixed with beans.				

Diversity and Traditional Use of Indigenous Foods, continued							
Species	**Family**	**Local Names**	**Usage**	**Medicinal Usage**	**Other Uses**	**Trad. Beliefs**	**Remarks**
Vatovaea pseodolablab	Papilionaceae		Immature pods, flowers and leaves eaten as a vegetable		Seeds eaten raw; juicy, fibrous tubers peeled and eaten raw both as food and as a source of water.		Tubers may be roasted, peeled and eaten
Vernonia cinerea	Compositae		Leaves used as a vegetable				
Vigna membranaceae	Papilionaceae		Leaves used as a vegetable, sometimes used with mashed maize and beans.				Said to taste like cowpea leaves.

Amaranthus sp.

A. thunbergii and *A. sparganiocephallus* are likely to be indigenous, but these two vegetables and *A. graecizans* have been reported in early ethnobotanical surveys. There is no indication of cultivation of these species in the past (common for most indigenous vegetables). Most are picked from the wild and when they appear in gardens, they are spared during weeding. Occasionally, there may be deliberate planting near homes by broadcasting. In more humid areas, the species of choice, determined by palatability, leaf size and abundance are *A. hybridus*, *A. dubius*, and *A. lividus*. While *A. graecizans* is grown in arid and semi-arid parts of Kenya. Amaranths are known for their 'strength" giving properties. Health workers have used these to control malnutrition in the communities. Seeds are particularly reputed for their exceptionally high nutritional value and, in particular, essential amino acids.

Gynandropsis gynandra

While in some communities *Gynandropsis gynandra* is highly recommended for pregnant and lactating women, other communities believe that when the leaves cause a mother's milk to dry up. Eating the vegetables of *Gynandropsis gynandra* is believed to reduce dizzy spells in pregnant women. It is also believed that regular consumption of the leaves by pregnant women eases childbirth by reducing labor length and helps them regain normal health quickly after birth. Among the Kisii, it is almost mandatory for women to use this before and after childbirth.

Solanum nigrum

Solanum nigrum has appreciable amounts of methionine, an amino acid scarce in other vegetables. Unfortunately, it accumulates anti-nutrients like nitrates, oxalates and phenolics, which reduce the nutritive quality of the leaves.

"Boiled leaves are recommended for pregnant women since their consumption is believed to result in birth of children with dark eyes and smooth skin. Moreover, pregnant women who eat these leaves are believed to recuperate well after delivery. It is also believed that children eating the vegetables do not get "marasmas" or "kwashiakor" especially if the vegetable is cooked with milk, groundnuts or simsim." (Edmund and Chweya, 1997)

Nutritional Value

Malnutrition, such as vitamin A deficiency can be greatly alleviated by consumption of dark green leafy vegetables, which are excellent source of proteins, vitamins, minerals and dietary fiber. when compared to exotic vegetables, may indigenous vegetables have equal or higher nutritional value.

Unfortunately, some of the vegetables are also known to have anti-nutrients[2] like nitrates, oxalates and phenolics as mentioned above. These anti-nutrients reduce the nutritional quality of the leaves (see note on *Solanum nigrum* above). This is where indigenous knowledge about the vegetables is important, especially in processing of the vegetables. Some communities have developed methods of processing the vegetables aimed at reducing the effects of anti-nutrients. By preparing Gynandropsis gynandra in a milk/ groundnut sauce some toxic constituents are bound by the protein in the milk.

Promotion of Conservation

In promotion of conservation, IFPP tried promoting the development of kitchen gardens. A project aimed at promoting the development of kitchen gardens in Masailand (Elang'ata Wuas) was started. In the beginning, the Masai did not embrace the idea of developing kitchen gardens. (The Masai consider most of these vegetables as animal fodder, and again, it is not in their tradition to use vegetables for food), but when given information on the nutritional value of the vegetables that could be grown in the kitchen gardens, the Masai women started their own gardens near their bomas. This was a breakthrough as traditional Masai diet is composed mainly of milk and meat. The only limitation was lack of water to help germinate vegetables. Elsewhere in Kenya, kitchen gardens development was very successful as it was seen as a way of bringing what one gathers from the wild close to the home.

[2] Nitrates are harmful to humans when consumed and converted into nitrites which oxidize ferrous ions of the blood hemoglobin, resulting in reduced oxygen-carrying capacity of the blood. Oxalates indicate the presence of oxalic acid in plant material. When ingested by humans, the acid combines with calcium to form an insoluble salt, which the body cannot absorb. This renders the calcium unavailable to the body. Phenolics bind proteins, hence interfering with the assimilation of proteins into the body. (Edmonds and Chweya, 1997)

Advantages of Kitchen Gardens

- They help save time spent in collecting vegetables from far away;
- Nutritional foods are available at all times;
- Food is secured for the family at all times, even in dry season, since some of the used water can be used to water the kitchen garden; and
- As mentioned above, some of the vegetables have medicinal value, therefore, they offer first aid medicine to deal with some emergencies.

Importance of Kitchen Gardens

- Act as repository of biodiversity;
- Help in home level conservation (home gene bank); and
- Retention of traditional practices that encourage not only cultural conservation but also genetic diversity.

Limitations of Indigenous Vegetables

- Problems caused by these species as weeds, range from economic losses due to competition with the crop grown, contamination of the actual crop through seeds, costs incurred for herbicidal and insecticide control of the plants;
- Young people regard them as low status vegetables, actually associated with poor people;
- Generally low yielding and the majority of the vegetables have a bitter taste (alkaloids) or sliminess, which enhance their unpopularity especially among the young;
- Most have small leaves, making them tedious to pick; and
- Most require special preparation methods making them not difficult to adopt.

Conclusion/Recommendations

Traditional leafy vegetables have been given low priority in most research and development programs. Little

is known about the indigenous cultivation techniques for those cultivated, knowledge and utilization, extent and structure of genetic variation, potential for crop improvement through domestication, selection and/or breeding. It is therefore important to have relevant studies undertaken and indigenous knowledge documented in order to help counter food insecurity.

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Paper 5

Tapping the Potential Uses of Indigenous Food Plants in the Sustainable Eradication of Food Insecurity for the People of South Sudan

Acuil Malith Banggol

Introduction

This paper was prepared to be presented at the workshop "Exploring the potential of IWFPs in South Sudan." The objective of this paper is to reflect on the plants proposed for cultivation in South Sudan. This presentation is limited due to its of lack of scientific proof, but I am confident in my indigenous knowledge. My hope is to encourage conference participants and stakeholders to support efforts which promote indigenous knowledge and subsequent exploration of indigenous resources.

Some Definitions

Liem: Liem is the Dinka word for "wild food." It literally means bagging from nature or the wilderness. "Liem" are conceived to be last-resort foods consumed by people who are made vulnerable during the period of food stress. It is perceived that "liem" are last-resort resources for the poor. However, there are some liem that are considered as delicacies such as "akuadha," "cum" (*Diospyros mesphilliformis*), "kuec" *(Myna tetraphylla*) and "raak" (*Butyrospernum paradoxum*).

Wild: Wild means primary, undeveloped or primitive food that costs nothing. This term is in comparison, not to domesticated but to modern or civilized. Naming the indigenous, non-domesticated resources as wild instills a stigma of low quality. It is assumed here that anything outside the homestead is inferior.

Facts about Indigenous "Wild" Foods

The history of the Dinka people has remarkable moments, which illustrates the importance of indigenous knowledge and indigenous food plants as life saving resources. The most recent example occurred in 1986, "ruon apaat," the year of "apaat," (*Ipomea sp.)*, in Bor County. During this year's famine, people were entirely dependent on the "apaat" plant as the only food source until the onset of harvest later in the year. Also in Twic County, 1988 is known as "ruon maraja," the year of review. It was called the year of review as people resorted to review every possible means of coping. Others say that it was called the year of review because the hunger came to review its ability to eliminate the lazy and weak. People depended on wild indigenous plants to avoid starvation.

Modern farming methods which continue to sideline the indigenous knowledge for the so-called 'superior" knowledge and resources are in danger of enslaving the rural majority making them more dependent on inappropriate technologies and thereby more vulnerable. Lack of research for promoting indigenous knowledge is caused by lack of resources, lack of motivation and lack of political will. It is contrary to the support that is going towards modernizing every sphere of life. In order for something to be "progressive" it must not lead to a decrease in diversity and to a greater dependency on fewer resources. Increased "quantity" and "quality," through mass production goes hand-in-hand with an increase in the risk of food insecurity as it doesn't allow for a variety of options. Mass production in most cases uses inputs that are concentrated among the few.

Among the majority of Dinka households, dietary balance might occur during the hunger gap due to the tendency to resort to diverse sources of food as they collect and consume a variety of wild foods from the wilderness. During the hunger gap the vulnerable group tends to consume a lot of green, leafy foods and wild fruits. This is contrary to the normal situation when the major source of food is cereals and milk, or milk alone and/or milk and fish. Consumption of green, leafy foods and fruits seems negligible to the Dinka. It is advantageous, however, to use these hunger gap foods as they complement and balance the normal diet since they are from more diverse food sources.

Modern agriculture with highly developed mono-cropping is presenting a false hope to the solutions of global or local food shortages. It is not true that increased production from the high yielding crops and highly productive farm animals increased production will necessarily provide for the needy. The real reason behind supporting the development of those resources is the high profit. This simply means that the returns, and therefore purchasing power, are concentrated among the few.

The other disadvantages of modern farming include its dependence on expensive unsustainable sources of inputs that are blamed for harming the environment.

More recognition of wild, indigenous crops will give local people a sense of the value and importance of natural resources. This will promote an understanding for the need to protect the ecosystem. Advocates of the modern farming tend to think of this as a backward approach however indigenous species tend to not only strive well in the original ecosystem but also to sustainable promote that ecosystem. At the same time, modern crops, especially genetically modified crops, heavily depend on the use of fertilizers and insecticides which are not only unattainable to the majority of the population but also interfere with the ecosystem. In developed countries, the emerging popularity of organic farming indicates that consumers prefer organic farming methods over the use the fertilizers and pesticides.

Common "Liem" in the Dinka Diet

Some indigenous "wild" food crops contribute greatly toward food security as last-resort foods, as delicacies and/or the major food source after cereals. Some of the following crops are frequently used more than legumes such as groundnuts and simsim:

Fruits: thou (*Balanities aegytiaca*), raak (*Butyrospernum paradoxum*), cum (*Diospyros mesphilliformis*), lang (*Ziziphus* sp.), ajuet (*Capparis decidua*.), akondok (*Boscia senegalensis*), riath (Caparis sp.), and kuec (*Myna tetraphylla*)

Oil: raak oil

Leaf: annet (*Cadaba farinosa*), ayaak (*Corchorus sp*.), thou, apaat (*Ipomea* sp.)

Cereals: akuadha (*Echinochloa colona* and other *Graminaceae*)

Root: kei (*Nymphaea sp*.), athon, and diany (*Nymphaea sp.*)

Seed: gor(*Nymphaea sp.*)

Indigenous Crops with High Potential to be Cash Crops

- Kuec (*Myna tetraphylla*)
- Cum (*Diospyros mesphilliformis*)
- Lang (*Ziziphus* sp.)
- Thou (*Balanities aegytiaca*)
- Akuadha *(Graminaceae)*
- Peny *(Acacia sp.)*

Indigenous Crops with Economical Benefit as Live Fencing

The Dinka farming system requires annual renewal of farm fencing. The annual cutting down a sizable number of shrubs, small trees and branches makes the fencing. A huge amount of damage is caused by this destruction as plants are not given time to regenerate and deforestation or the loss of vegetation occurs, thereby, allowing for wind and rain erosion. The promotion of live fencing would reduce the annual damage to the environment. The following plants are suggested for live fencing and have the further benefit of providing fruits:

- Thou
- Kuec

Feeding farm animals grass fodder alone is not sufficient, as there is a need for fodder plants, which are in minerals. Some indigenous plants are known locally to have a beneficial impact on soil fertility such as the leguminous plants:

- Acic
- Pac (*Philostigma thonningii*)

Recommended Measures to Promote Use of Indigenous Food Plants

- Further research into the nutritional values of the wild food will eventually enhance a change of attitude and the possible future propagation of those wild foods.
- The findings of such analysis should be disseminated through publications and extension workers to benefit the target groups (the consumers, farmers and policymakers).

SUPRAID Capacities to Promote Sustainable Agriculture

SUPRAID, an indigenous NGO, has the moral obligation and commitment to promote indigenous knowledge and crops. SUPRAID has established community-based extension services. Members of a given community are trained and contracted by SUPRAID to use their own land to demonstrate farming techniques. Community Development Workers, known as CDWs, are also contracted to train contact farmers interested in learning alternative farming methods. In Twic County there are now eleven male and four female CDWs throughout the six payams with a minimum of two per payam. The CDWs who are encouraged and paid to work with contact farmers are supported with inputs to set up demonstration plots and to establish seed banks. These seed banks are hoped to be the future germplasm source in the county.

SUPRAID has developed an incentive package built on the success of such seed banks and trained farmers who apply their knowledge. It is hoped that, with availability of resources, an additional incentive package could be tailored to encourage the promotion of the ecosystem in farming by ensuring the use of indigenous wild food crops in demonstration farms.

For further information please contact Acuil M. Banggol, Chief Administrator of SUPRAID, Box 77901, Nairobi, Kenya, Tel: 604565 Telfax: 605952, e-mail: SUPRAID@maf.org.

Discussion/Comments from the Floor

1. A participant stated that there is an assumption that communities are not aware of nutritional values, or which plants are best to cultivate. He warned that we should not undermine the local knowledge and we should take advice from the community. The speaker responded that we need to build on that knowledge. That is why agriculturalists, extension workers and others are needed. It was important to talk to the communities and utilize the knowledge and also replace inappropriate local knowledge, and show by demonstration what is sustainable and environmentally friendly.

2. We must be aware that different groups have different priorities and it is necessary to have them talk and exchange views. The example was cited of men, whose priority might be feeding cattle, and women, whose priority might be how far they go for firewood.

3. One attendee expressed the opinion that mono-cropping and mechanized farming would eventually be necessary to start the country's industrialization and now is the time to start. A participant responded that much research shows that mixed cropping could bring equal and sometimes higher yields than mono-cropping and that diversity, not mono-cropping, is the best way ahead because it reduces the risk of losing everything.

4. Wild foods are eaten in times of stress. In order to avert this stress participants suggested that it was important to select appropriate plants for certain situations, e.g., there are some yams and other root vegetables which can be grown on land where cattle are present because the cattle won't eat them.

5. One participant remarked that mono-cropping versus mixed cropping was usually considered an either or issue. He advocated that a combination

of these methods is both possible and productive. Technology and development can be supported, while at the same time as diversity and food security is maintained.

6. In addition to the cultivation of various wild food plants, preservation and management *in situ* needs to be considered.

7. One participant stated that the group had lost its focus on the theme of the workshop by discussing mono-cropping versus multi-cropping. He felt we should be discussing how to use wild foods in normal (non-famine, non-war) times.

8. One participant stated that there was a need for more research on diversification and identification.

Exercise 4

Exercise on the Economic Potential of IWFPs

Participants from Southern Sudan were asked to:

1. Mention two indigenous food plants which are sold at the market frequently.
2. Mention an indigenous food plant which has special economic potential (even for export).

Facilitator's Remarks

1. From the list of IWFPs commonly found in Sudanese markets, and the list of IWFPs which could be exploited and exported, we arrived at the following characteristics of South Sudan's IWFPs:
   - diversity
   - usability
   - potential to be in the market place
2. The population has changed. Children have lost the knowledge of IWFPs in Kenya and probably more so in Sudan where there have been gaps in their education.
3. Part of this group's (participants) role is to increase awareness, not to cause dichotomy or conflict.
4. There was a comment that the different names for the same plants cause confusion. The facilitator then sorted out the multi-lingual duplications and the group arrived at a single list of plants suitable for exploitation and export.

Conclusions for Day 1

There is inadequate awareness, both on the part of those living among the IWFPs and among those who have been educated to know of their uses. The lack of awareness is shown by the fact that:

1. IWFPs are available and common, but are largely ignored;

2. Harm is being done through practices that are destructive to nature; and

3. There is a need to know more about the nutritive value of IWFPs.

Response

1. Preservation;

2. Conservation in terms of use and protection;

3. Diversification of food basket; and

4. There is a need to address all the issues above.

Paper 6

Contribution of Wild Food Plants to the Acholi and Madi Food Basket

Lawrence Otika Joseph, CRS/Sudan, and Cirino O. Oyiki, CARE/Sudan

Sources of Food in the Acholi and Madi Area During the War

Food Source	Annual Contribution
Own crops	26%
Wild Foods	20%
Trade/Exchange	11%
Kinship	7%
Meat/Hunting	9%
Fish	9%
Honey	6%
Relief [3]	12%
Total	100%

Own Crops

The Acholi and Madi communities are predominately agriculturists. The area falls within the Green Belt and Hills and Mountain Food Economy Zones. The area has rich soils and good rainfall. The mean annual rainfall around Palotaka is 1,350 to 1,600 mm. The soil in Madi area is low in fertility and the mean annual rainfall in Pageri is less than 1,200 mm. There are two cultivation seasons in the corridors with the first starting in March and continuing to July, the second is from August to December. The quickly maturing crops in the area include sorghum (serena/seredo), sweet potatoes, maize, bullrush millet, groundnuts, pumpkins and beans. These crops are planted in April/May and harvested in July/August. The long season crops are sorghum, simsim and hard nuts (sogo). These crops are generally planted in second season (July/August) and harvested in December/January/February.

The low grain carry over from 1996/97 led to less area cultivated since the very poor lacked the energy to complete cultivation and some lacked seeds. Contaminated/mixed seeds supplied to CRS/Sudan, insecurity and the effects of erratic rainfall aggravated low crop yields. As a result household food source dropped to 26 percent while consumption of wild food plants went up to 20 percent. Under normal conditions, the communities here are fully dependent on their own crops and eat wild food plants only as delicacies.

Wild Foods

As given above, wild food constituted 20 percent of annual household food needs in this period. The Acholi corridor has a wider variety of wild foods than Nimule corridor[4] due to better soil and rainfall. Wild foods are divided into normal and distress foods. The most common distress wild foods in the Acholi area is *Kinju* (a poisonous wild yam which is soaked in water for one to two days after boiling for a long time to break down the poison). It is only after soaking that it can be cut into slices and eaten or made into food and eaten. *Akuru* (poisonous seeds), found in the Nimule corridor, is another distress food. The seeds are boiled for a long time then washed in fresh water, dried and cooked. It is either eaten alone or mixed with groundnut or simsim paste, and lulu oil. Tamarind seeds are also eaten during distress. The seeds are fried and thrashed to remove the outer cover. It is then washed, mixed with cassava flour made into food and eaten.

The very poor expanded the list of normal wild foods in February 1998 after consuming all the threshed grains in June/July before harvesting the short season crop. Currently, some of the very poor, IDPs and new

[3] Key informants consider the relief contribution of 12 percent to represent the deficit faced by IDPs, returnees and some resident populations.

[4] Common wild food in the Acholi area are: kinju, bato, boye and modo (yams), lyeno (a tuber mixed with ashes and boiled before eating), leafy vegetables like ocobo, osuga, ayuya, iliri in acholi, ailema, logwere, memele, korofobambe and lalop. Fruits of lalop, lulu, zany, acoga, water lily, tamarind, uba and duhwila are also eaten.

returnees are feeding on wild yams, coconut sprouts and various leafy wild foods available. A good number have started processing *Kinju* for storage. In 1999, it is estimated that these socio-economic groups increase the use of normal wild foods as in 1998, although some have started on the distress wild foods. The wild yams are normally harvested from January to March. As the rains start the quality of the yams deteriorate because reserve starch in the tubers is used for growth. The tuber becomes spongy and not good for processing and consumption. It is estimated that the availability and accessibility of *lulu*, yams and *lalop* will increase 20 to 25 percent of the 1998 level. This is because of the high rainfall experienced in some of the area where the above are growing.

Some Common Wild Food Plants Found in the Acholi Region

Acholi Name	English Name	Scientific Name	Part Eaten	Use	Good Stress Indicator
Yaa	Shea Nut Tree	Butryrospermum nilotica	Fruit/Kernel Oil/Butter	Major	Yes/No
Logwat	Balanites	Balanites aegyptica	Fruit/Kernel/ Leaves	Major	Yes/No
Obwolo	Anona	Anona senegalensis	Fruit	Secondary	Yes
Duro	Ficus	Ficus spp	Fruit	Secondary	Yes
Kworo	Ficus	Ficus spp	Fruit	Secondary	Yes
Olam	Ficus	Ficus spp	Fruit	Secondary	Yes
Cwa	Tamarine	Tamarindus indica	Fruit	Major	Yes/No
Tugo	Fan Palm	Borassus aethiopium	Fruit/Kernel/ Sprout	Major	Yes/No
Lango		Ziziphus abyssinica	Fruit/Kernel	Secondary	Yes
Kwomo		Nauclea latifolia	Fruit	Major	Yes/No
Oywelu	Vitex	Vitex doniana	Fruit	Major	Yes/No
Larweco		Bridelia scleroneuroides	Fruit	Minor	Yes
Olemo		Ximania americana	Fruit	Secondary	Yes/No
Yago	Soucages tree	Kigelia africana	Fruit	Minor	Yes
Pobo		Grawia mollis	Fruit/Leaves	Minor	Yes
Acoga		Hymenocardia acida	Fruit	Secondary	Yes/No
Lalukuluku			Fruit	Minor	Yes
Kibuy			Leaves	Minor	Yes
Lakalangau			Root	Minor	Yes
Lobangkuda			Root	Minor	Yes
Mwonyo			Fruit	Minor	Yes
Ogo			AerialFruit	Major	Yes
Kinju	Wild yam		Tuber	Major	Yes
Bato	Wild yam		Tuber	Major	Yes
Ocuga		Solanum nigrum	Leaves	Major	Yes/No
Okengo			Leaves	Major	Yes/No

Some Common Wild Food Plants Found in the Acholi Region, continued					
Acholi Name	**English Name**	**Scientific Name**	**Part Eaten**	**Use**	**Good Stress Indicator**
Ocobo	Amaranthas	Amaranthas spp	Leaves	Major	Yes/No
Otigo	Jews melo	Hibiscuss spp	Leaves	Major	Yes/No
Oyado			Leaves	Major	Yes/No
Ayuya			Leaves	Major	Yes
Ambwara			Leaves	Major	Yes
Owii			Leaves	Minor	Yes
Bwoyo			Leaves	Minor	Yes
Logoroto			Leaves	Major	Yes
Ongubi			Leaves	Major	Yes
Okeyo			Leaves	Major	Yes/No
Lalebrec			Leaves	Major	Yes
Ocayo			Fruit	Secondary	Yes/No
Bwoye			Root	Secondary	Yes
Olok	Wild grape		Fruit	Minor	Yes/No
Owak			Fruit	Minor	Yes
Cubik			Leaves	Minor	Yes
Lyeno			Root	Minor	Yes

Paper 7

Research on Indigenous Food Plants in Southern Sudan

Caroline Gullick, WFP, and Birgitta Grosskinsky, CRS

We would like to thank the following organizations for their support of Save the Children's Southern Sudan Program, World Food Program, German Agro Action, UNICEF, Christian Relief Services and USAID. We would also like to thank SRRA for their support advice and hospitality in Sudan.

Introduction

Previously, the limited information collected on IWFPs in southern Sudan focused on the overall calorific values of a small selection of wild foods. It did not take into consideration the full range of wild foods available and their nutritional composition. This has led to a general belief that they do not make a significant contribution to the diet except during times of food shortage.

Considerable research has already been carried out on the importance of indigenous food plants and their potential in Africa. This research has opened up new areas for improving food security and economic opportunity. Many of these foods are the same species as those commonly used in southern Sudan.

It was necessary to have a greater understanding of the range of available wild foods in southern Sudan, their seasonality, accessibility, nutritional content, social and economic value in order to achieve a realistic picture of their role in overall food security.

Aim of the Research

- Gather baseline information on the wild food plants utilized in southern Sudan.
- Make appropriate information available to personnel involved in food security, health, nutrition, agriculture, formal and non-formal education programs.
- Provide baseline information which can be used to achieve a better understanding of the resource and encourage further research into the utilization of indigenous resources promoting both their sustainable exploitation and their protection.

Findings of field research to date

It was found in the study, that the foods are a part of the normal diet; are crucial to people's survival during times of food shortage; are the nutritional equivalent of, and in some cases superior to, introduced vegetables and fruits; play a major role in the diet of children; are both palatable and enjoyable; are of particular economic importance to the poor and to women in general; are used to protect family assets; have been domesticated; diversify the diet and are adapted to their environment.

Methodology

Although the research has been carried out in a variety of locations at different times, the approach and methodology employed by the two researchers has been very similar.

Research process

The research was carried out under the auspices of Save the Children's Southern Sudan Program, World Food Program, German Agro Action, UNICEF and Christian Relief Services.

Research Methodology

A participatory approach was taken to gather a wide range of information regarding people's perceptions and experiences. To do this, the following types of interviews were held: individual, group, gender specific, age specific, occupation specific and wealth specific. Discussions were held with individuals who do not have a voice in public forum, such as the displaced, destitute, widows and children. This breakdown into groups of different informants and individuals was essential for clarifying different perceptions.

To facilitate the research, community maps, seasonal calendars and wealth ranking data from the WFP Food Economy Analysis Unit (FEAU) was used. In addition, similar exercises were to be carried out when necessary. Participant observation, proportional piling and ranking and other Participatory Rural Appraisal (PRA) research methods were utilized during interviews and visits. A literature search was done of similar studies and inventories on IWFPs in other African countries.

Sudanese people also collected data independently of the two researchers with the use of a questionnaire (see Appendix 5); they included members of the SRRA, agricultural co-coordinators, international NGO staff and others. The information proved to be a very effective for cross checking findings and providing new means of enquiry.

While the researchers were working they would also try to create an awareness about the reasons for the research and would discuss some of the nutritional aspects, the importance of a varied diet and information they had about the same foods used in other countries or other parts of southern Sudan.

An approximate analysis of carbohydrate, fat, protein, fiber and ash and an analysis of the vitamin and mineral content was carried out at the Department of Food and Technology and Nutrition (Kabete Campus) University of Nairobi College of Agriculture and Veterinary Sciences. A total of 100 specimens have been analyzed to date.

Locations

The above objectives were researched in the following counties Twic, Gogrial, East Awiel, West Awiel, Wau, Rumbek, Yambio, Yei, Bor, Maridi, Torit and Kapoeta.

Activities

The research was conducted in phases. The first phase was implemented in southern Sudan by collecting baseline information. A location was visited three times in order to collect data, cross check information already collected and take advantage of the seasonal changes in terms of food availability and dietary changes. The initial visit to a site last for approximately one week, during which time interviews were held, households, farms, markets, cattle and fishing camps and key resource areas were visited. The stay of subsequent visits depended on the type of information required. The locations to be visited were sometimes changed depending on the safety of some areas. Sometimes locations were interchanged with areas of similar socio-economic dynamics and ecology.

Plant specimens were collected throughout the duration of research as they became available for identification purposes. The specimens were labeled with their vernacular name, location and date of collection and then pressed. Fresh samples for nutritional analysis were transported to the OLS Camp in Lokichoggio northern Kenya where they were frozen and later transported to a laboratory in Nairobi. Drawings and photographs were also taken when possible to illustrate the data.

Baseline Information Gathered in all Locations Visited

1. Local name of the plant;
2. Type of plant (tree, grass etc.);
3. Which part(s) is/are eaten (fruit, leaf, tuber etc.);
4. When it is harvested;
5. Who harvests it;
6. Is it stored;
7. When is it eaten;
8. Who consumes the foods (men, women, girls, boys);
9. How is it eaten (raw, cooked, dried etc.);
10. What type of food is it considered to be snack, staple, relish, famine, etc.;
11. Is it cultivated; and
12. Can it be sold in the market or exchanged?

Second Level of Information Gathered in Specific Locations

1. How is the food prepared;
2. What other foods are consumed with it;

3. Quantify amounts of IWFPs collected and frequency;

4. Ascertain the social and economic status of the different groups who consume the food;

5. Record the cultivation practices for the species under domestication, i.e., who cultivates them, why and where;

6. Establish why these particular plants are domesticated;

7. Understand the local rights and access to the wild resource; and

8. Find out if there has been a change in the availability of the resource and map resource areas.

Third Level of Information to Achieve a Better Understanding of the Potential of the Foods

1. The economics of marketing IWFPs;

2. Exploring local perceptions of promoting IWFPs; and

3. Determine the local civil administration's plans, local resource management policies and commitment to the conservation of the resource base.

The second and third visits were also used to fill in gaps in the information already collected and for cross checking data. After compiling site information, the findings were returned to the locations from where they were gathered in order for the researchers to provide feedback on the accuracy of the information. Unfortunately, there was no response.

Plant samples collected in the field were identified, where possible, by their scientific names. An approximate nutritional analysis of the calorie value, protein, carbohydrate, fat and some vitamins and minerals was conducted. Collected data will be compiled and analyzed.

The data has been entered into a database, which is being up-dated and amended as new data comes in. See Appendix 6 for an example of the data.

Modifications, Constraints and Lessons Learned

The proposed original methodology could not be strictly adhered to as the actual approach necessitated a greater degree of flexibility in order to take advantage of opportunities as they arose. Lost time and study interruptions, due to being unable to access areas or spend the necessary time in the field because of insecurity or weather conditions, was particularly problematic for the collection of specimens as it was not always possible to reach the locations at the appropriate times. Even under these circumstances, however, it was still possible to carry out the research. Out of necessity, the information gathering process was, for the most part, less formal than originally planned.

The list of wild foods compiled is comprehensive but by no means exhaustive. Specimens for nutritional analysis were purchased from local markets, bartered for from local households or donated by respondents at the time of interview. The collection process was very much a case of what was available at the time of the visit and many specimens were unobtainable.

Collecting and keeping the specimens in good condition for the nutritional analysis was a problem. Lack of refrigeration facilities in the areas of southern Sudan visited meant that timing was crucial for the collection of freshly cooked food specimens and had to be timed with the arrival of a plane to the area which could transport the specimen to the refrigeration facilities in Lokichoggio. This feat was hard to accomplish.

It was not possible to identify all the specimens, due to the poor quality of some as a result of mould, insect infestation or the lack of key identifying features such as the inflorescence. Some specimens could only be identified by their genus. The identification was carried out by two researches at the Herbarium of the Museums of Kenya. The classification of some of the plant groups, for instance, *Dipcadi sp.* and *Cucurbits* represented a considerable challenge to skilled taxonomists and there wasn't time or financial resources to go beyond this fairly rudimentary attempt, although it should prove adequate for the level of enquiry of the research.

The majority of the interviews were conducted through male interpreters; it was impossible in most of the areas to find women who were able to speak English. Often the interpreter was of a high social status, as those with a formal education tend to be. It is hard to say what influence these two factors may have had on the respondents, who were often women of low socio-economic standing and children. Interpreters were crucial to the research, but they varied tremendously in

ability. It was not always possible to work continuously with the same interpreter in some areas; this often daily change would affect the continuity and quality of the work. This resulted in a greater emphasis on observation and participation. Some of these areas had been receiving food aid, at best, infrequently for 12 years. In the last five years, however, they had been receiving food aid with greater regularity. This food aid created a bias, which had to be taken into consideration. This can influence the attitude both of the interpreter and the respondent if it is perceived that their answers may have an effect on food aid since this study, for the most part, was carried out in areas where there wasn't a food distribution team or assessment teams.

The photographs were developed in Nairobi some time after they were taken. It was therefore not always possible to retake a photograph, which did not come out well. Though the photographs were initially taken to illustrate the data they were also found to be a useful research tool during interviews helping the interviewer and the interviewee to refine some of the anomalies.

Walking around the area with a key informant was found to be an important part of the interview process, as seeing different plants reminded people of points and foods they had not mentioned, as well as providing good cross-referencing material. Visiting households during meal preparation time had a similar effect. It provided points of focus, making it easier to clarify questions and giving a more direct contact with the respondent who tended to be more informative with the relaxed approach. Sometimes it was possible to gather interesting information without an interpreter, often by just spending some time with a family and observing their activities. The more the researcher participated in the collection and preparation of the foods, the more enthusiastic the informants became and hence provided greater insight into the subject.

In areas of food scarcity, it was important to be able to exchange your own food for a food sample since it may be the family's evening meal which they will be reluctant to part with unless you can give food in exchange.

A general knowledge of the food economy of the area and being able to demonstrate basic a understanding of the subject helped a great deal during the interview process, as this prompted a greater depth to the informal discussion. It was also important to be wary of using leading questions but not dismissing them entirely as they can be used as a tool to provoke debate and as a cross-checking device.

Given the problem of accessing some of the areas and not necessarily being able to do follow up visits, a questionnaire was developed to cover the general field of inquiry. This was given to an English speaking volunteer who, would interview a group of people and fill in the information, at the same time stating who his/her group of informants were (i.e., Male/female, approximate age and social status). In addition, interviews were conducted in refugee communities in Kenya. This was interesting as a cross-check of information.

Database

It was decided that, the best way of storing the information would be in a database, which would have a more specialized use. The database would enable people to select the precise information they require, both specific and general information, as well as statistics. These can be printed out in a catalogue format or chart format as required. The database is developed in such a way that the user can select the information they require specific to their needs, with easy cross-referencing. For example:

- Which foods are collected by boys in a given area?
- Which wild foods are available during a given month in a specified area?
- Of the wild foods available in a given month, which are sold in the market?
- Out of all the wild food collected from the Ironstone Plateau, what percentage are fruits?

Interpreter bias can also be a constraint. Male interpreters may not be so co-operative carrying out interviews on a subject they have little interest in such as wild food. They also may not feel comfortable discussing something which is the "concern of women." This was certainly the case with more than one interpreter in the research carried out in southern Sudan. Male researchers may encounter cultural barriers, which inhibit or prevent them speaking openly with women informants. Similarly women may not feel free to express their views through a male interpreter to a female researcher. On top of this there are cultural constraints for the interviewer and limitations of courtesy

and tact, language barriers and the problem of asking awkward and maybe embarrassing questions in the presence of hosts or guides.

Discussion/Comments from the Floor

1. *Question*: Are new foods or new varieties discovered during times of hunger?
   Response: Some are new foods to some people, some are traditional but this is difficult to categorize. For example, children will sometimes eat certain foods which adults do not, until a food shortage when everyone eats them.

2. *Question:* Are some foods becoming scarce?
   Response: There are constraints to collecting IWFPs in communities. For example, in Akak, the fruit ajuet is becoming less and less available because of fires and the collection of water lilies may need a canoe.

3. *Question:* could the project be biased because accurate information cannot be collected in a short time? Wrong information may be given by communities, especially if the assessment is carried out in association with a food economy assessment. Language difficulties and different plant names may also serve to bias the research.
   Response: We try to eliminate all bias, the information is continually updated with new information and amendments. Contributions, feedback and any suggestions for improvement are welcome. Questionnaires are administered by Sudanese to Sudanese, so there should be less bias. It is important to look at IWFPs in context – it is not about trying to prove that they are the most important part of the diet, but trying to identify the role they play. It was added that the issue of different names for the same species, and the same name for many different species causes confusion but is not an unsolvable constraint.

4. One attendee stressed the right of the community to understand why the research is being carried out, who would have access to the results, and what the approach would be?

5. One attendee suggested that as many people as possible should have access to the data base. He also asked what is the prospect for sustainable growth and protection of IWFPs?.

6. There should be similar opportunities for growth, as there are in other countries. War should not prevent the sharing of information. She said that prospects for the future will be discussed at greater length later in the workshop.

7. *Question:* Is a gene bank going to be developed to ensure the continuation of given species?
   Response: Currently our work is to gather the information so that decision-makers can make better and more informed choices.

8. One attendee suggested that the researcher not being African was a serious constraint. He also asked if cross-checking (e.g., working with counterparts) was occurring. His experience in East Equatoria suggested that language was a problem – everyone answered ”yes” to all questions because it was the simplest word to use. The researcher admitted that more feedback is needed, but stressed that the questionnaires are simple and are administered by Sudanese, so language should not be a problem. The same person asked that the size of the population canvassed in the research be given, and he asked for more information about reference material and books.

9. There was a question about distinguishing between famine and non-famine foods in terms of food value and how to propagate. The same person asked how honey should be defined, whether as plant or other food. The presenter described the food groupings of the database.

10. Has anyone looked at the traditional tools for collecting WFPs? The example of collecting rice was mentioned.

11. The presenter described the constraints in her research regarding multiple names for plants, language barriers, and the lack of research facilities and funding.

Exercise 5

Exercise Based on a Proposed Pilot Rehabilitation Project

Presented by Jean Pierre Mambounou (WFP)

Jean Pierre's presentation outlined a proposed pilot project developed with local counterparts for an area in South Sudan where food-for-work was being put forward as an option to support environmental rehabilitation for communities re-settling in the area.

Objectives

- Identify priority projects
- Promoting local project ownership and responsibility for operation and maintenance
- Setting up a data base of projects selected by the population and there leaders

Activities

- Sustainable livelihood
- Agriculture
- Small-scale livestock husbandry
- Forest development and conservation
- Rural services and infrastructure
- Irrigation
- Rural infrastructure and resettlement
- Human resource development
- Capacity building
- Increase of literacy among youth
- Empowering women through involvement in rehabilitation activities

Strategy

- PRA and RRA approaches

Constraints

- Security
- Time
- Staff availability

Time frame

- Two months

Exercise

Taking the project outline as an example, the participants were asked to form groups to think about the issues and discussions raised during the first day of the workshop and the data available on IWFPs and environmental

issues and apply it to an imaginary situation represented by pictures issued to the different groups. The groups were given three pictures and were asked to brainstorm and answer four questions. The following are the questions and a summary of the answers from the groups:

What is the problem portrayed by each of these posters?

- Destruction of the ecosystem
- Deforestation
- Decrease in bio-diversity
- Land degradation

What are the solutions to the problems?

- Reforestation program
- Policies for forest protection
- Proper land management practices
- Encourage agro-forestry activities
- Need for more research of root causes of the problem
- Training in bio-diversity conservation at the community level
- Introduction of alternative sources of fuel planting fast growing local varieties
- Use of alternative energy sources e.g., solar.
- Avoid over-grazing

Who could best address the problems?

- Community external support
- Policymakers, donors, NGOs, food-for-work
- Civil structure indigenous NGOs international NGOs
- Legislative body - liberation council
- At community level, education curriculum to include topics on tree planting
- Forestry Department to be leading body in reforestation

How can the solutions have a long-term effect?

- Community awareness adoption of conservation is possible
- Gain information on law and policy on environmental conservation
- If local communities are involved in planning and ownership, then success would be ensured
- Long-term legislation to guide/regulate use of forests
- Community participation in maintenance and monitoring impact through building its capacity.
- Access to natural resources
- Competing community needs - forest resources and land resources
- Consider community interests and needs
- Security
- Prioritization of use of natural resources.

Discussion/Comments from the Floor

1. It is still necessary for communities to cut down trees. However, there is a need to determine what are the

basic needs of the community and to set priorities, which may still include the clearing of land.

2. There is nothing inherently wrong in exploiting forests. The danger lies in destroying them.
3. At this level, we cannot decide what the problems are. We need to consult the communities.
4. One attendee described the situation of “Mabiol Gol” in Bor where the river is blocked by reeds. The community wants to clear the reeds and build a dyke, but there may be flooding if this occurs.

Conclusion

1. Communities need to be consulted.
2. Priorities need to be set.
3. We need to improve education and awareness in rural communities and target youth in education programs.
4. We must provide alternatives to destructive practices. The example was given of burning bush instead of clearing it, because snakes are present. Another example was making a fire break so that the burning is controlled.
5. On one hand we say we want to create awareness, and on the other hand we say the community is aware of non-destructive practices. The communities don’t know. They carry on with destructive practices because they see good results, not bad. We must ensure the problem is properly identified and then that the people understand the problem.

Paper 8

AVRDC/Africa Regional Program: Scope of Activities on Indigenous Vegetables

M.L. Chadha and R. Nono-Womdim, AVRDC/Africa Regional Program

Introduction

The Asian Vegetable Research and Development Center (AVRDC) is an international not-for-profit organization for vegetable research, development and training that is committed to the world's food security. Its general mission is to enhance the nutritional well-being and raise the incomes of poor people in the rural and urban areas of developing countries through improved methods of vegetable production, marketing and distribution and, at the same time, taking into account the need to preserve the quality of the environment.

As stated in the AVRDC Action Plan for 1998-2002, the Center shall pursue any and/or all of the following objectives pertaining to vegetable research and development:

- The conservation and characterization of genetic resources and their use in developing improved varieties;
- The generation of new knowledge and technological innovations for increased productivity of vegetables, with particular attention to sustainability and the prudent use of inputs; and
- Strengthening national vegetable research capacity in the developing countries through information services, training and collaborative research.

The Africa Regional Program (ARP) extends into Africa the general mission of AVRDC. ARP began its operation in June 1992. Its mandate is to conduct research and provide training and information activities for the benefit of the African national programs. ARP works in collaboration with African national research and extension systems (NARES) to:

- conserve and enhance the genetic resources of selected vegetables;
- develop improved varieties and sustainable production technologies;
- disseminate relevant vegetable research information;
- train promising African vegetable researchers;
- strengthen the national research institutions in the region.

In addition, linkages have been established with NGOs and the private sector for technology adaptation and technology dissemination at the farmers" level.

ARP addresses the major research issues of its mandate commodities as follows:

- vegetables that are strategically important in the major regions of Africa, considered as regional commodities, such as the African indigenous vegetables (AIVs);
- vegetables which are particular to the AVRDC's mission, considered as the global commodities, such as solanaceous species (tomato, eggplant and capsicum); bulb alliums (onion, garlic and shallot); crucifers (common cabbage and Chinese cabbage) and vegetable legumes (mungbean and soybean).

The Vital Role of Vegetables

The important role of vegetables in human nutrition has long been recognized. They are especially important in developing countries of the word. Malnutrition is widespread in many rural communities in sub-

Saharan Africa, particularly in low rainfall areas. Some estimates indicate that two billion people or more live at risk of contacting diseases caused by lack of vitamins and essential minerals. Of the millions of children who die every year in developing countries, half die from malnutrition. Such widespread malnutrition exists despite the impressive gains that have been achieved in global agricultural production. For example, in the past two decades cereal yields have doubled. However, in some parts of the world, high-yielding varieties of major staple crops have displaced traditional crops. This situation has led to substantial reductions in the diversity of cropping systems and has appeared to contribute to micronutrient deficiency. For developing countries, the consequences of micronutrient deficiencies are severe. Generations of school children unable to learn can grow up to be a nation's burden instead of its strength. Thus micronutrient deficiencies can be viewed as an outcome as well as a cause of under development. The problem can be partially alleviated by the utilization of vegetables which constitute an excellent source of vitamins and minerals essential for good health. Moreover, vegetables also represent supplementary sources of proteins and calories, thereby contributing still further to good nutrition and human health.

Over the last decades, international and national support of agricultural research has focused on a narrow band of commodities, including maize, wheat, rice and internationally-traded fruits such as banana. Crops that provide an important contribution to a balanced diet, such as vegetables, have received comparatively little support. Even where research has been undertaken, there is a concentration of effort on commodities such as tomato or cabbage that have no cultural or agroecological tradition in the majority of developing countries.

In Africa, AVRDC, through its Africa Regional Program, has undertaken a major research and development thrust on vegetables including African indigenous vegetables (AIVs). The major outcomes of these activities are to:

- Improve the nutritional status, enhance the quality of life of the urban and rural poor, and raise healthy young children through increased utilization of vegetables, including AIVs.

- Develop a strong base of research and development at different levels of NARES and NGOs for continuing the generation, verification and transfer of technologies related to vegetables.

- Transfer knowledge, plant materials and technologies to households and schools through on-site demonstrations and short training courses, especially for school teachers and women.

- Promote AIVs as potential crop diversification options for broadening the nutrition base through the improvement of varieties, seed production and food preparation.

- Development of effective information, education and communication methods for policymakers, educators, farmers and child care-givers with the aim of promoting vegetable production and consumption for micronutrient intervention.

- Make available extension materials like slide sets, leaflets, booklets and guides for different extension agencies and farmers.

Major Achievements on AIVs

Since 1993, germplasm and management research activities on AIVs are being implemented in AVRDC's ARP. Local populations of AIVs like African eggplant, amaranth, black nightshade, corchorus, Ethiopian kale, spider flower, etc. have been collected, purified and characterized. Management studies range from cultivar description, fertility and spacing experiments, effects of removing apical dominance on plant development, influence of stress on duration of harvest and yield, etc., studies on the identification and management of major diseases of AIVs are also conducted. Results of such studies are now being confirmed before the new technologies and/or information are passed on to the SADC NARS and African countries.

Genetic Resources

Germplasm has been introduced to some AIVs, e.g., amaranth, have been conducted. A number of promising germplasm have been identified and multiplied for further tests in Tanzania and other SADC NARS.

A small experiment for plant vigor and apparent tolerance to the turnip mosaic virus (TuMV) in Ethiopian mustard (Brassica carinata) has been carried out

on heterogeneous local populations that are popularly grown in Tanzania. S1 progeny testing for plant vigor and anthocyanin pigmentation and reconstitution of new base populations by intercrossing horticulturally similar types led to the development of new base populations. Evaluations of these new base populations indicate that one, Mbeya Green, yields twice as much and has a longer harvest duration, thus a longer productivity period than the local populations distributed by HORTI-Tengeru.

Future Research and Development Activities

Future activities will emphasize the following major points:

Germplasm collection, characterization and maintenance. This activity will be extended to countries not covered in early surveys. Collected germplasm will be evaluated and maintained at AVRDC-ARP.

Socio-economic surveys. Socio-economic surveys of AIV consumption and supply in selected areas to generate a better understanding of the socio-economic constraints to AIVs production and consumption and of the role of AIVs in improved interventions for child nutrition and health.

Seed production and distribution. This activity will be continued to enable interested NARES and NGOs to have access to the best possible germplasm.

Agronomic studies. Pertinent information pertaining to cultivation techniques, time of planting, response to inputs and adverse growing conditions, disease and pest management, soil moisture and water management, and adaptability to cropping sequences at the garden production level will be generated.

Training. Various training modules will be developed for the target groups.

Paper 9

Community Resource Rights

Christine Kabuye, Former Botanist, East African Herbarium

Introduction

Local or indigenous communities have been referred to as custodians and stewards of natural resources. This is because they have a close relationship with these resources. In addition, however, they depend on these resources for their survival. The element of survival means that first of all the communities try to ensure their right to life. But life itself revolves around rights and obligations. Communities may have had the right to help themselves to natural resources, but they also had the obligation to maintain the resources in such a way to ensure that the resources would be available for use in the future. So, the notion of conservation of resources was always there. Such obligations and responsibilities were actually built into beliefs, norms and practices that governed and guided resource management and use among many communities. The resource management systems, which were developed over ages and became entrenched in people's cultures, were well-understood, at least before colonialism. The role and responsibilities of indigenous institutions like the council of elders, clans and the heads at different levels, were geared toward management and control of resources for the continued livelihoods of community members.

In many African societies, land was communal, and within this communal land, families would be allowed patches, which they could use for subsistence farming and, over time, family members would inherit these. The livestock keeper would graze his animals in areas left for the purpose. The traditional healer in the village would collect medicinal plants from the forest. The women would collect medicines and the various foods from the forest or other parts of the landscape. The men would hunt, harvest honey and discover new useful plants, which they tended in their natural habitats, but now and again, introducing a few near homes for convenience.

Such systems were not by chance, but by design. The local communities thus had communal ownership of land and the natural resources on it, which they managed and controlled.

Effect of the Colonial Era

In Kenya, the land and resources that the local communities had were denied them the minute they were huddled off to the so-called African reserves. The land came under new ownership, that of the colonialists, and the land was called the "white highlands."

The communities lost their rights to the land, and they lost their rights to the resources. Their survival needs did not matter. What mattered to the colonialists was the economic production of crops that would satisfy overseas markets.

In addition, chunks of land were made into national parks for wildlife and forest reserves mostly for timber. This further meant that pastoral communities lost large areas of grazing lands while some forest communities were relocated to unfavorable lands. Unfortunately, the situation is still the same to today and it has continued to affect the rights of access to resources.

Community Resource Rights

This Paper addresses community resource rights. What do we mean by this? We need to start with some definitions:

Community is made up of people who live and organize themselves for general communal good, usually with cultural beliefs, practices and norms related to their well-being as a whole.

Resources include language, knowledge, skills, tools, cultural values, land and the natural resources on which people depend for livelihoods of the present and future generations.

Rights as related to resources constitute the right to use, own, access, manage and control and, thereby, benefit from use of such resources.

Right to Language

Everyone has a language as a way of expressing him

or herself. This is especially important in rural communities where most of the information is passed on in oral traditions. Unfortunately, a number of languages are threatened before they are even written down.

Right to Knowledge

Indigenous knowledge contains the basic information about any resource within a community. This is what is built up and added to with newer experiences. It includes ecological knowledge and processes. It is passed on from generation to generation, but there is danger that the young generation is not interested and it is important that education systems are developed to teach indigenous knowledge. The use of the knowledge would be shared within the community for the sake of the community members.

Right to Skills and Tools

Skills and tools within the community relate to practices of how things are done and what processes are involved. These would go hand in hand with indigenous knowledge and is controlled by the community.

Right to Cultural Value

The right to cultural value is part of the right to self-respect.

Right to Natural Resources

Natural resources make up the life support system for all human societies and it is the right of local communities to have access to natural resources for their livelihood.

Food Production

Food production among local communities is made up of farms, which are usually small and multi-cropped, and the wider landscape where other plants and plant products are collected. This involves the right to access food resources from the forest and other habitats.

Right to Seeds

The agricultural communities have over the years domesticated and selected plants, developing them into crops. Therefore, they have the intellectual contribution, which needs to be recognized and respected by those who consider themselves as scientists and plant breeders. The process involved in the farmers" selection is much longer and with a longer experimentation period. This needs to be considered by breeders before they patent any "new" invention, the farming community would in actual fact be the real inventors. The seed selection made by peasant farmers is made with particular attributes in mind to suit the farming community's requirements. The farmers therefore should be left with the right to keep and plant their seed for their food security and not forced of obtaining seed supplied by the government.

The Case of Displaced Communities

Africa has had its share of displaced communities due to land excision for other purposes, famine, conflicts and wars, many times creating influx of refugees to unfamiliar lands with unfamiliar food sources. There are some stories told that in the old days, if there was trouble and people had to move, the first thing they would pack were the seeds of some food plants. Even slaves were often found with seed. This was possible because communities used to manage their seed supply. These days when governments insist on supplying seed to be planted, it is not possible to have seed to run away with. The only alternative is food aid and more supplied seed.

The important thing is that the displaced communities have lost many rights. They have lost their right to land and natural resources. In turn, their knowledge systems and, ultimately, their lives have been disrupted; they have been made helpless. Probably the only comfort is that they would still have a language as a resource. They would remember names of their favorite foods and if they were asked, the names might lead to locating seeds for them to plant, if the climatic conditions are the same. Once the plants have been re-introduced in their lives, the rest could be left for them to manage and control and make further decision on the resource use as communities.

To rehabilitate the morale of displaced communities, the supply of seed could extend from direct food plants to others like good bee honey source plants, shade plants (some sacred trees), or trees that support edible caterpillars. All these can eventually add to food security, while nurturing cultural values as part of the welfare of the people and restoring a few of their 'spiritual" rights. One hopes that as they develop the small pieces of land given to them, they can be allowed to consider them and the resources developed on them as their own.

Conclusions

In dealing with community resource rights, the resources have been defined as language, especially noting the oral nature of most of the information communicated within the communities; the knowledge or indigenous knowledge held by cultures as a fundamental guide to information on other resources, including, the natural resources and all processes; skills known and practiced especially in preparation and processing activities; tools; cultural values as attached to natural resources; and the natural resources themselves. These resources have been viewed from aspects of use, ownership, access, management and control, as well as possible benefit from their use.

Discussion/Comments from the Floor

1. Indigenous people are being robbed of their rights, but often they are not aware of the potential IWFPs. Research Centers in Kenya are focusing on improving germplasm. Though it was perceived that it would be better if every farmer kept their own seed, it was felt that with industrialization the increment in productivity requires that seed multiplication and adequate germplasm be available.

2. There was a comment about preserving traditional seeds and providing these seeds to displaced people, i.e., providing seeds as a form of relief.

3. Displaced people cannot obtain the things they have been accustomed too, in their homeland. The solution is to stop the cause of the displacement. Becoming dependent on UNHCR and others is not an acceptable solution.

4. The government of Kenya has set aside areas that are not accessible to the population. These areas now bring wealth to the entire country. Which is worse – to deprive a single community of its future or to deprive the country of a significant source of income? Mrs. Kabuye's response was that revenue from national parks does not go to the people who have been displaced from the land.

Paper 10

Customary and Civil Laws Regulating People's Rights to Wild Natural Resources in Southern Sudan

Justice Deng Biong Mijak

Introduction

This paper may not be comprehensive and satisfactory for the following reasons:

1. The time to prepare it was so short and the presenter did not have facilities or a conducive atmosphere to produce it in a shape better than this one.

2. Our Customary Law in general is not developed and the customary rules governing the people's rights and access to natural food resources in particular are not well articulated in legal instruments, thereby making it a difficult task to research them.

This underdevelopment and under-rating in customary laws in Sudan in general, and in the South Sudan in particular, is not new. It has been and still is systematically intended by the Muslims Fundamentalists and the Arab minority clique dominating the central power in Khartoum. This clique wants to impose their faith (Islam) and the Arab culture on us on the alleged ground that we in the South suffer from what they term in Arabic "El Faraag El Thakafi," meaning a cultural vacuum.

As you shall observe, this paper highlights mostly Dinka customary rules on the subject under discussion. This is due to two reasons. First, for reasons not clear to me, Dinka customary laws is researched and recorded better than the customary laws of the other nationalities in South Sudan; e.g., "the code of Dinka Customary Laws which constitutes Part Two of the restatement of Bahr el Ghazal Region Customary Law (Amended) Act, 1984." Secondly, being a Dinka, by nationality, the presenter is unavoidably influenced by his personal experience and knowledge of the Dinka Customary Law.

It is common knowledge that natural food resources are found on land, either on the surface or underground. Therefore, we cannot examine the customary rules governing the people's rights and access to these resources without examining the customary rules related to land tenure.

Customary Rules Governing Land Tenure

The position of land tenure in our New Sudan Legal System is not clear. But, the old Sudan Legal System, which was regulated by the Land Settlement and Registration Act of 1925 and the Unregistered Land Act of 1970 stated that:

"All waste, forest, occupied, unoccupied and unregistered land is deemed to be government property and to be registered under the Land Settlement and Registration Act, 1925."

"Although, according to this Act, the government is the dominant land owner, the customary rules operate (within the framework of government ownership) to regulate the use of land among the tribal communities. In practice, the statutory provisions operate in certain towns or developed areas. Government ownership of all the land in the country is merely theoretical. Among the rural communities, in many areas, rights over land are being regulated by customary rules, however, this does not deprive the government of its theoretical ownership."

The said act recognized private ownership of land, though not absolute and subject to some other liabilities, interests and rights such as rights of way, rights of water and other easements.

It is worth noting that though these rights are not well-stressed in the urban areas, especially in the north,

they are widely exercised by the public in the traditional south where the communal usage or ownership of land is predominant.

Types of People's Rights to Natural Resources

The people's rights and their chances to have access to natural food resources can be classified into (a) rights in and/or over land; (b) grazing rights; (c) hunting and fishing rights; (d) fruit collection rights; (e) rights to drinking pools; and (f) rights to collect wild foods and others.

Rights to Things on Land and Underground

As stated before, the community owns the land (arable or residential) and the individual community members acquire ownership of their plots by virtue of their membership in the community. This is illustrated by the fact that if you are banished from the community territory by your community, you are entitled to collect your bedding, domestic animals, agricultural produce and any other moveable properties, but you cannot dispose of your land and whatever is fixed on it by way of sale or gift as most communities in the world do.

Also, when you go and join a new community, you acquire a piece of land by virtue of having acquired membership of the new community.

As for the ownership of things on land or under ground, there is a general understanding that they belong to the owner of the land, and as Justice John Wuol Makec (one of the few writers on Customary Law in the Sudan) puts it: "A distinction must be made here between different things that can be found on land."

There are non-living and living material or property, which may be movable or immovable, and there are living things such as animals. Domestic animals are excluded because every domestic animal has an owner. The animals referred to here are the wild animals and fish.

It is an accepted principle that a landowner owns the things on it as well. For example, there are usually fruit trees on the arable land of an individual. He may have "raak" *(Butyrospernum paradoxum)* or "akaan" *(Borassus aethiopicum)* on his land. He has an exclusive right over them. It is not necessary that he planted them himself, but he has exclusive right of ownership by virtue of the fact that he has the ownership of the land.

If his neighbors come to enjoy the benefits of these things, it is through his expressed or implied permission.

Further, there are many herbs, plants or roots of certain trees or plants, which are useful drugs and medicine. These are usually dug from the ground or obtained from trees or plants. An owner of the land in which these things remain buried or on which they are fixed owns them.

Grazing Rights

This right is only exercised by the tribes that keep cattle, goats and sheep though not necessarily confined to their territories. For the Dinka, this is mainly exercised in the "toc," a low land with open plains which are seasonally flooded and remain swampy for a considerable period in the year e.g. the Sudd region along the Nile and Guarkou between Mundari in Equatoria region and the Aliap Dinka in Bahr el Ghazal region. This is important for those who depend on cattle because it consists of large rich pastures.

All people are entitled to graze their cattle, goats or sheep in these pastures regardless of whether you are from the community that owns the "toc" in question. The only obvious exception is when a community is on unfriendly terms with the community owning the "toc." Here the former is excluded to avoid clashes.

Hunting and Fishing

Though we have admitted before that the community owns the land, it is difficult to establish its ownership and control over the wild game and fish found in its forests, rivers and lakes. The difficulty lies in the fact that the wild game or fish moves from one territory to another. No community can claim to control it, though it has the right over the hunting ground to the extent of excluding non-community members or allowing them impliedly or expressly.

Allow me to cite this interesting case to illustrate this point;

"In a chief's tribal conference in the early 1940s, the late Chief Macar Anyijong claimed that where a member of his tribe injured an elephant in his territory and the wounded animal moved to the land of another tribal

community, the animal was still his or the property of his people. If the members of the other tribe completed the killing of the animal, the tusks should be given to him (Chief Macar Anyijong). He then put a claim against Chief Deng Jok, of the Jur Tribe, whose people killed the elephant which had been wounded by the Apaak people (i.e., the people of Chief Macar). The reply of the Chief Deng Jok was that if Chief Macar claimed the ownership of the animals which had once been in his territory, he had no objection to giving up the tusks or parts of the animal, provided that Chief Macar and his people compensated his people (i.e., Chief Deng Jok's people), some of whom had been killed or injured by those wounded elephants or other animals. But Chief Macar refused to accept responsibility for the acts of those animals over which he had no control. The conference declared that Chief Macar was defeated in his claim."

As for fishing rights, I have never come across any civil law or custom in South Sudan preventing any person from fishing in any river or lake. All community members are generally allowed to fish in the ponds, rivers and lakes owned by their respective communities. Strangers are allowed as well unless they violate some fishing regulations. I remember in my home area, Abyei, a tribal fight historically referred to as "Tong e Dieer," or fight of Dieer, which was caused by a misunderstanding that erupted between some of our Ngok Dinka men (i.e., the community owning the fishing site) and some Rek (Abiem) Dinka men who joined in fishing. Normally, when people are fishing, cattle must be kept away from the fishing site. The Rek, it seems, did not observe this regulation. Cattlemen and some of their cattle went into the river and dismantled hooks deployed by a certain Ajuong Deng Jelei (from Ngok Dinka). Ajuong furiously protested and insulted the Rek men. Because he, Ajuong, was not traditionally initiated, one of the initiated Rek men got provoked and hit him with a stick. Ajuong charged in and threw one of them into the water making it worse. A fight broke out that later engulfed the two tribes.

As Professor Evans-Pritchard put it: "Tribes and tribal sections jealously guard their fishing rights, and people who want to fish extensively in a pool must first obtain permission from its owners if they do not want to provoke fighting."

Before people are allowed to fish in some main pools, lagoons or rivers (e.g., Kol – pool; Yura in Abyei county; Weer – river; of Abung-Yath in Twic County) certain rituals or ceremonies must be conducted by Bany-Bith (spear leaders). Sacrifices of a cock, a bull, or a goat (dragged into the water alive) are made for the river spirits to protect the fishermen/women from snake-bite and to reconcile people's souls to avoid fights at the fishing site.

As for Luo of the Bahr el Ghazal Region, rivers are divided among the tribal sections. Each section has a spiritual leader who must bless the pool or the section's part of the river by taking offerings such as a cock, a goat, and dura and submerge with those offerings underwater for two days. If the river spirits refuse, then the spiritual leader comes out and tells people to wait until they are allowed. Otherwise, nobody can fish without the permission of the river spirits. In Equatoria, I found this river-blessing process being followed by the Pajulu tribe.

Some Practices Associated with Fishing Rights

The Practice of "Mek Erec," Speared Fish Baggings

I have seen this practice being followed by the Ngok Dinka. It is a way of sharing the catch of the day among those who participated in the fishing. It operates like this: If person A spears a fish, person B who is fishing nearby can jump and catch the upper end of the barbed spear and say "ekedi" (meaning "it is mine") or "ace meek" (meaning "I have bagged it.") The fish will be surrendered to person B. Person A can also bag, not necessarily from person B, but from any other person using a barbed spear to fish. The objective is for all people to go home with some catch, for there are some who fail to catch any fish, and these must be helped in that way.

The Practice of "Pel"

This practice is followed in the Twic area of the Bahr el Ghazal Region. It operates as follows: When a person spears a fish but that fish manages to free itself and escape, the person who speared it regards it as his "pel". If any person subsequently catches it, the first spearer will rush to claim it on the grounds of the wound which he allegedly inflicted. This procedure is normally allowed, but sometimes disputes arise, especially between a member of the Twic community and a stranger whose community does not observe such practices. The case of the "Tong Apioth" fight of

Apioth illustrates this situation. An Apioth (a small fish not weighing more than a kilogram) was speared by an Adiang (a section of Twic Dinka) man but the fish freed itself. It was later speared and caught by a man from Abiem (a section of Rek Dinka of Awiel) who was fishing nearby. Immediately, the Adiang man claimed the fish as his "pel". The Abiem man, whose community does not follow the pel practice, refused and a fight broke out at the fishing site (Makuac-Alal) in Adiang territory. The Abiem men who were from the cattle camp, were reinforced from home (Awiel) by their tribesmen. The Adiang section as well was reinforced by the other Twic sections. It was a big tribal fight caused by small fish. Casualties were heavy on both sides.

Right to Collect Wild Fruits, Seeds, Roots and Tubers

Like hunting and fishing, collection of wild fruits, seeds or roots is a dry season and early rainy season occupation in most tribal communities. These wild foods, e.g., wild dates or "akarap", seeds of wild sorghum or "abeet", seeds of wild rice or "ayai", seeds of wild millet or "bildiet" or "akuadh", seeds or "gor" and roots or "kei" of water lilies and bush yams, etc., supplement people's diet at times of self-sufficiency or constitute the basic food at times of famine.

People have rights to collect them. No civil or customary law restricts them in exercising these rights. But these days, I hear that due to famine caused by both war and drought, some communities in the Bahr el Ghazal region have started to prevent others from utilizing these natural resources in areas under their respective communal control.

Right to Drinking Pools, Wells and Reservoirs

People are entitled to have access, together with their animals to water from pools, public wells, lakes and reservoirs. Whoever fouls or pollutes these public water points is punished under Section 139 or our New Sudan Penal Code, 1994. The section reads:

"Whoever voluntarily pollutes or fouls the water of any public well or reservoir or other public water supply so as to render it less fit for the purpose for which it is ordinarily used, shall be punished with imprisonment for a term which may extend to eighteen (18) months or with fine or with both."

Recommendations

Finally, allow me to recommend the following few points:

1. Full research should be carried out to ascertain the customary laws that various tribal communities in South Sudan apply in regulating the rights discussed above.

2. It is observed with great regret how our environment suffers every year from fires set in wild forests by unknown persons. Some effects of these fires are the destruction of natural resources before people could utilize them. The New Sudan Civil Authority is urged to enact laws that will ensure our environmental protection in general and punish those who set wild fires without authorization.

3. The New Sudan Civil Authority, through tribal chiefs, should regulate the use of some natural fruits such as "lulu" seeds (known internationally as shea butter nut), gum-arabic and wild dates.

4. The Local Civil Authority, the community leaders and NGOs should encourage root crops (e.g., cassava) in drought-affected areas to act as a reserve in famine years. They should also encourage the production of food surplus in the fertile areas, e.g., Yambio, Yei, etc., to support normally drought affected areas in Eastern Equatoria and Northern Bahr el Ghazal. In Yambio and Tambura counties, respectively, World Vision and CARE are supporting this initiative.

5. It is likely that our Wildlife Authority in the New Sudan shall enact laws prohibiting people from killing certain species of wildlife, e.g., elephants, hippos, etc. Such laws are needed to preserve our wildlife. But at the same time, I recommend a law to be enacted binding the Wildlife Authority to compensate the poor cultivators whose crops have been destroyed by wild animals.

Discussions/Comments from the Floor

1. One attendee told of being prevented from fishing in Banya, although everybody should be free to go fishing. Another attendee explained that in certain months, and in certain rivers, fishing is prohibited. Also, in May and June there is a ceremony which all families observe, and no one fishes during certain hours.

2. Is there any legal protection for farmers whose cassava (or other) crops are trampled by cattle during the dry season when the cattle are allowed to roam more freely? The response was that the cattle are supposed to be herded to avoid doing damage to crops, but in fact in the presenter's experience there are no laws which adequately cover this situation. Meetings are now being held, and there may be a change soon. He specifically mentioned the situation of people displaced from Bor. They have cattle, and the people in their new location are mainly cultivators. Problems have arisen as both groups try to use the land.

3. An attendee commented that there should be compensation by the Wildlife Authority for destruction caused by protected animals.

4. A new phenomenon has occurred during this time of famine, i.e., people have tried to assert ownership over wild food, chasing others away.

5. It was asked if there was any legal right of "long usage" for communities or people who have traditionally picked fruits, etc., when they are challenged by newcomers. (The response was that there is nothing in place.)

6. Is there any possibility of legislation to control the opening of forests, to identify protected ("good") trees or to prohibit the destruction of certain indigenous plants? (The response was that there is nothing in place.)

7. There is a loss of traditional control due to the war situation. The problem is not that displaced people don't know that some of their practices are destructive to the environment. The reason is that they are not at home and they care less about the property of others. There was agreement that more control is needed. One attendee stressed that traditional rulers must be involved in deciding which areas displaced people should occupy.

Exercise 6

Constraints to the Utilization and Promotion of IWFPs

In this exercise the participants were asked to give constraints and put forward possible solutions.

Constraint: Insecurity

Solution:

- Permanent political solution;
- Strong governance;
- Community leaders to keep peace;
- Formal and informal education in Sudan should go on despite insecurity and in refugee Sudanese communities this education should include indigenous knowledge as well as scientific knowledge; and
- Peace should be promoted particularly between neighbors when resources need to be shared.

Constraint: Lack of awareness of the nutritional value of IWFPs

Solution:

- Disseminate nutritional information through nutritional training programs and community leaders;
- Increase research into nutritional values on more food varieties;
- Prepare and disseminate literature and visual aids on the nutritional importance of IWFPs;
- When implementing nutritional training programs, trainers should focus first on locally known plants which are accessible to the communities in which they are working with before looking at exotic varieties;
- Develop education packages with well researched information for different audiences on food values;
- Demonstrate food preparation methods that maximize the nutritional potential of different foods;
- Use songs to spread information; and
- Hold field workshops to share and exchange information.

Constraint: Poor management of the eco-system

Solution:

- Raise awareness by holding meetings and discussions with the community leaders, local authorities, teachers and members of the general community;
- Encourage the media to promote a more objective approach to their reporting on IWFPs not just focusing on them being famine foods;
- Incorporate indigenous and scientific knowledge of wild foods into agricultural and nutritional training programs;
- Raise awareness among the donor and NGO groups of the importance of appropriate responses for requests for assistance;
- Conserve natural resources;
- Promote drought-resistant plant species; and
- Develop training programs which address ways of preserving bio-diversity for sustainable exploitation.

Constraint: Negative perceptions about IWFPs prevent members of a household from consuming the food. This is an especially crucial issue for pregnant women.

Solution:

- Enlighten community leaders and the educated elite in the community on the beneficial properties of IWFPs, so that they do not humiliate the users of the foods;
- Encourage further research which will provide a better understanding of the importance of the foods and ensure that the findings are shared with the communities from where the research originated;
- Teach the community leaders about the need for bio-diversity in plant life and how this is important for the conservation of the environment;
- Encourage community leaders and international organization to set an example by showing greater interest in the IWFPs;
- Encourage the domestication of some of the more nutritious wild food plants; and
- Research how the stigmas surrounding IWFPs arose.

Constraint: Availability of IWFPs

Solution:

- Improve IWFP storage technologies which will ensure that foods are available during the hunger gap season;
- Share knowledge of the foods which are more tolerant to drought and which are more tolerant to flooding;
- Encourage the development of demonstration plots using appropriate native species showing how they can be available in the dry season;
- Provide more education on IWFPs adaptability to their environment and resistance to pests and diseases; and
- Research drought and flood tolerant plants to identify which ones should be protected.

Constraint: Certain wild food plants risk extinction because laws do not exist that protect IWFPs

Solution:

- Review community and individual ownership rights;
- Use political means to protect the resource base and the sustainable use and management of the resource;
- Develop laws which will help sustain natural resources and identify ways of addressing the population's needs which do not put their livelihoods at risk;
- Preserve genetic material through domestication or management;
- Use education to stress that wild resources are finite and that care needs to be taken to manage them sustainable; and
- Educate people about the reasons for the promotion of bio-diversity.

Constraint: Research is connected to hunger food (associated with relief therefore reinforcing a negative perspective of the foods)

Solution:

- Involve Sudanese organizations and international NGOs in collecting information and disseminating information; and
- Identify different methods of collecting data.

Constraint: There is a risk that research remains academic and information is not effectively disseminated or shared.

Solution:

- Find ways of disseminating information to people and organizations who can utilize it, this includes the communities from which it came, international and national relief and development organizations, local administrators, church leaders and donors.

Constraint: Labor-intensive preparation methods and lack of knowledge about the preparation methods of some IWFPs can be dangerous.

Solution:

- **Research should be carried out into improving processing technologies;**
- Improve storage methods;
- Ensure that village elders pass on their knowledge to the young in the community; and
- Demonstrate cooking and food preparation methods in schools and at the village level particularly with displaced communities who may not be familiar with the local plants.

Constraint*:* **Domesticated foods are more popular than IWFPs**

Solution:

- Demonstrate the nutritional benefits of IWFPs;
- Have NGOs and SINGOs focus more attention on indigenous resources which are beneficial to the community, this will attach a new importance to the foods and elevate their status;
- Demonstrate that there are IWFPs which are better adapted to their environment and require less maintenance and inputs;
- Work with cultural values; and
- Demonstrate the need for dietary diversity.

Constraint: Displaced populations do not value the resources in the areas where they are taking refuge.

Solution:

- Encourage community dialogue between host population and displaced groups regarding local resource use and laws; and
- Have organizations assisting the displaced groups respect local use and management of resources and seek ways of offering assistance which do not lead to the deterioration of the local environment and the private gain of a few individuals.

Constraint: Collection of wild foods can be dangerous because of wild animals

Solution:

- Advise people to move in groups; and
- Domesticate some varieties or encourage them around the home areas.

Discussion/Comments from the Floor

1. There was a question regarding identification and documentation of wild foods, and a question regarding the customary laws of the people who own the WFPs.
2. Many responsibilities have been given to the Sudanese. Without resources, however, they will not be able to meet these expectations. Jason explained that much of the work could be done by agencies/people who already work in the areas. Their duties could be expanded to include the tasks outlined in the presentation.

3. There was a suggestion that the people/groups/structures who are the major participants in effecting the needed changes be identified. An attendee responded that this identification has already occurred and was used to bring together the members of this workshop. It was added that there is a need for pairing of Sudanese and NGOs in partnership.

Conclusion:

The facilitator profiled seven key areas which emerged from this exercise:

1. Identify and document what already exists;
2. Focus on increasing awareness, access to information and networking;
3. Involve the Sudanese in research;
4. Implement capacity building, e.g., language, naming plants and identifying who else should be involved;
5. Educate, disseminate and raise awareness among the community, leaders and researchers to ensure that we move beyond a report to positive action;
6. Develop policy and legal framework; and
7. Apply and practice, using models, practical examples

The group was asked to clarify the goal, and state why these seven steps must be taken. Answers included:

- Promote food security;
- Help children;
- Change attitudes towards IWFPs;
- Ensure that donors, NGOs and the community recognize the role of IWFPs to increase protection of the environment;
- Collate existing knowledge;
- Recognize what exists to better change and develop food security; and
- Develop self-dependency and tools to manage during disasters.

Exercise 7

Recommendations for the Future of the Resource

The whole forum split up into four groups. One group was formed of only Sudanese participants and the other groups were formed according to fields, which were connected to wild foods (agriculture, nutrition and information).

The groups were asked to discuss how the ongoing research of IWFPs should be carried out and improved, how the knowledge gathered during the studies could be implemented in different programs, and future utilization of IWFP.

The groups were asked to come up with recommendations, who should implement them, and an approximate time-frame in which the actions should be implemented.

In the following the recommendations of the different groups are given:

Group Recommendations			
Group 1 (Info) **Recommended Action**	**By Whom**	**Methods/Resources**	**When**
1. Build on existing data a. Cross check b. Add samples and data c. Depending on use, collect additional info information	Sudanese SINGOs, NGOs on ground, WFP	A. Identify Sudanese people who continue gathering info in their different locations (identification of people from the system. B. Sudanese to review database/	1 month – 6 weeks Same
2. Increased access/awareness to information a. data base b. books c. educational material	A. Workshop participants to inform and raise awareness of the available info/possible use. B. Sector leaders to develop materials	A. Circulation of IFP workshop proceedings/papers B. Meetings held with sector leaders C. Development of training materials/ literature from existing (non)-Sudanese sources	3 weeks 6 weeks from now Depends on project type
3. Develop IWFP system for indigenous food security monitoring/early warning	A. SRRA database B. WFP/other food security agencies C. NGOs on ground	A. Community identification of key factors	before annual needs assessment
4. Practice what we preach	Participants	A. Plant/manage/consume wild foods (i.e. plant local food trees in our compounds)	When in Sudan

Group Recommendations, continued			
Group 2 (New Sudan) **Recommended Action**	**By Whom**	**Method/Resources**	**When**
1. Identification of documentation of wild food and socio-economic, customary laws	A. Secretary of Agriculture and Animal Resources B. Secretariat of Wildlife Conservation C. Community D. Researchers (local and internal) E. donors, NGOs, SINGOs	A. Regulate research procedures B. Botanical and lab analysis C. Funding	Aug '99 and ongoing
2. Participatory research to be emphasized	Same as above	Pairing up of local and international researchers and organizations	Aug '99 and ongoing
3. Capacity building	A. Donors and INGOs B. Regional bodies	A. Support local organizations with resources to conduct research to disseminate information B. Access to regional labs and research centers and training	Aug '99 and ongoing

Group Recommendations, continued			
Group 3 (Nutrition) **Recommended Action**	**By Whom**	**Method/Resources**	**When**
1. Access to information a. Contribution to information b. Networking – international c. Dissemination	WFP, NGOs, donors, community, schools and institutions, research institutes, agricultural institutions, health and nutrition (public health) institutions, community development	A. Publications B. Media C. Teaching materials D. (PRA)	ASAP – Jun, Jul '99
2. Research a. food processing/receipt b. storage c. nutritive losses d. toxicity e. post-harvest technology f. preparation/recipes g. consumption patterns in past and present h. socio-economic survey (market value, constraints, etc.)	WFP (and other agencies), community (research process), relevant institutions as above	A. Develop methodologies B. Generate resources C. Identify missing links	Early 2000 and ongoing
3. Education (awareness raising)	A. Implementing agencies B. Women's groups C. Community D. Schools, etc E. Agricultural extension groups	A. Development of curricula B. Development of teaching methods and materials C. Development of visual aids D. Training centers	NOW!
4. Policies a. preservation b. access c. rights and laws of ownership d. conservation e. domestication f. security	A. Community B. Leaders *Bottom up approach	A. Group discussions B. Formulate relevant policies	Start brainstorming NOW!

Group Recommendations, continued			
Group 4 (Agriculture) **Recommended Action**	**By Whom**	**Method/Resources**	**When**
1. Collection of more information	Organizations on ground with relevant program in partnership with SRRA and/or local Agriculture Department	A. PRA tools	Ongoing
2. Creating awareness	NGOs and SRRA (in the sector of Agriculture, Nutrition, and Education)	Formal and informal education, demonstration plots	Continuous
3. Protection	Civil authority and community	Enact law on environmental protection such as bush burning, tree cutting (felling), etc	As early as possible
4. Processing	Supporting NGOs	Introducing/improving appropriate technology for processing	As early as possible
5. Propagation	Collaboration between NGOs, gov't institutions, and local organizations	Participatory research and multiplication	As early as possible
6. Increase information network	Between all local and international orgs. in Sudan and E. Africa	Exchange of info and update	Immediately

Appendix 1
List of Participants

Name	Address
Achol Oyier	SSRA, Gogrial County
Acuil M. Banggol	c/o SUPRAID, Lokichoggio
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Claude Jibidar	WFP, Lokichoggio
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Dr. Samuel Mayak Deng	SRRA, Rumbek County
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Effisio Kon	Commissioner of Wau County
Emilia Ami	SRRA, Yambio
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Jaden Tongun Emilio	SRRA – Kerwa c/o NPA Koboko
James Kamunge	WFP, Lokichoggio

Jan Gerrit Van Norel	FAO, Box 30470, Nairobi
Jason Matus	WFP, Lokichoggio
ean-Pierre Mambounou	WFP, Lokichoggio
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Josphat Nanok	WFP, Lokichoggio
Judge Deng Biong	High Courts S R, Maridi, c/o SRRA Maridi
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Liz Phillippo	CEAS
Luka Biong	SRRA, Nairobi
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Maker Lual Kuol	CRS, Nairobi
Mary Abiong Nyok	SRRA, Lokichoggio/ Twic County So. Sudan
Mary Nyanut	SCF (UK), Lokichoggio
Mawiir Nyok Lual	SRRA
Michael Tewolde	CRS, Nimule
Muthoni Mwangi	WFP, Lokichoggio
Nyandeeng Malek	SUPRAID, Lokichoggio
Pascal Bandindi	c/o UNICEF/OLS, Yambio
Phanuel Adwere	UNICEF / HHFS
Raphy Favre	ICRC, Lokichoggio
Regina Bhuiyan	ICRC, Lokichoggio
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Tim Fison	SCF (UK), Lokichoggio
William Fielding	SCF, Nairobi

Appendix 2

Comparison of Chosen Indigenous Wild Fruits with Cultivated Fruits (Paper 3)

Scientific name	Part analyzed	Moist. [%]	Crude Prot. [g]	Fiber [g]	Ash [g]	Fat [g]	CHO [g]	Energy [kJ]	Ca [mg]	Mg [mg]	Na [mg]	P [mg]	Fe [mg]	K [mg]	B-carot [mg]	A.acid [mg]
Balannites aegyptiaca	kernel dried	5.00	23.00	5.4	3.20	43.5	25.30	2,289	172.0			508.0	7.00			
Balannites aegyptiaca	fruit (flesh)	64.00	2.20		1.90		31.90	511	47.0							14.00
Carissa edulis	fruit (flesh)	77.20	3.40	2.0												
Ficus sycomorus	fruit (whole)	82.70	1.30	3.6	1.30	0.9	13.80	227	68.1	42.3	3.91	36.5	1.94	399		
Grewia bicolor	dry fruit	13.20	10.30	13.5	5.90	0.1	70.50	1,302	268.0	317.0	12.40	181.0	5.92	1,707		9.30
Grewia tenax	fruit (whole)	59.14	4.50	21.13	4.33	6.8	69.87		1,875.0	1,205.0	350.00	2,750.0	125.00	7,500	1,400	161.09
Parinaria curatellifolia	fruit (flesh)	64.83	3.85	2.16	11.98	4.3	77.72		227.7	137.0		78.3	16.90	1,559		7.41
Sclerocarya birrea*	flesh	85.00	0.50	1.2	0.90	0.4	13.20	225	20.1	25.3	2.24	11.5	0.50	317		194.00
Sclerocarya birrea*	nut	4.00	28.30	2.9	3.80	57.3	6.60	2,703	118.0	462.0	3.81	808.0	4.87	601		
Strychnos spinosa	fruit (flesh)	78.80	2.70	1.4	1.80	0.1	16.60	305	45.8	43.6	4.55	22.6	0.75	328		10.60
Tanmarindus indica	fruit (flesh)	20.60	3.10	3.0	2.10	0.4	73.80									
Vitex doniana	fruit (flesh)	70.60	0.70	1.3	0.90	0.4	27.40	435	34.0	2.7		47.0	2.70			9.00
Ximenia americana	fruit (flesh)	64.80	2.80	1.2	1.90	0.8	29.70	556	7.6	31.1	1.25	35.4	1.27	718		68.20
Ziziphus mauritiana	fruit (whole)	17.40	4.30	3.4	2.80	0.1	75.40	1,201	210.0			56.0	3.00			24.00
Magnifrea indica	fruit (flesh)	82.90	0.60	0.2	0.50	0.9	15.80	251	24.0			22.0	1.20		3,200	42.00
Ananas comosus	fruit (flesh)	86.80	0.40	0.1	0.30	0.5	12.40	197	16.0			14.0	0.40		90	34.00
Carica papya	fruit (flesh)	90.80	0.40			0.4		104	21.0			15.0			950	52.00

Food composition/100 g of the sample analyses.

Appendix 3

Comparison of the Composition of Indigenous Wild Vegetables to Cultivated Vegetables (Paper 3)

Plant	Common /local name	Zinc	Iron	Calcium	Vit. C	Vit. A
Momordica foetica	Himiri (Dongotono)	0.50	8.98	309.45	33.36	1.77
Justicia sp.	Luri (Dongotono)	0.49	17.37	927.98	30.89	4.61
Gynandropsis gynandra	Atagiri (Lokwa)	0.57	56.25	217.14	23.47	3.09
	Noloyore (Lokwa)	0.27	9.64	485.19	22.23	2.93
Tribulus terrestris	Nenguere (Lokwa)	0.67	60.68	579.17	25.44	3.81
Solanum americanum	Nolorongi (Lokwa)	0.26	11.36	184.87	14.83	4.96
*Brassica oleracea**	Cabbage		0.70	47.00	54.00	1.00
*Cucurbita pepo**	Cucumber		0.80	477.00	80.00	3.60
*Solanum lycopersicum**	Tomato			35.00		8.00

**Source:* National Museum of Kenya. (B. Grosskinsky, GAA, 1997)
Values given in mg per 100g edible portion.

Appendix 4

List of Indigenous Vegetables in Kenya (Paper 4)

List of Indigenous Leafy Vegetables in Kenya

Species	Family	Species	Family
Adansonia digitata	Bombacaceae	Erucastrum arabicum	Brassicaceae
Aerva lanata	Amaranthaceae	Gynandropsis gynandra	Capparaceae
Amaranthus sp.	Amaranthaceae	Ipomoea mombassana	Convolvulaceae
Asystasia mysorensis	Acanthaceae	Ipomoea aquatica	Convolvulaceae
Asystasia gangetica	Acanthaceae	Kedrostis gijef	Cucurbitaceae
Balanites aegyptiaca	Balanitaceae	Kedrostis pseudogijef	Cucurbitaceae
Basella alba	Basellaceae	Lablab purpureus	Papilionaceae
Brassica carinata	Brassicaceae	Lagenaria siceraria	Cucurbitaceae
Cleome hirta	Capparaceae	Launaea cornuta	Compositae
Cleome monophylla	Capparaceae	Leptadenia hastata	Asclepiadaceae
Coccinia grandis	Cucurbitaceae	Oxygonum sinuatum	Polygonaceae
Coccinia trilobata	Cucurbitaceae	Oxygonum salicifolium	Polygonaceae
Commelina forskaolii	Commelinaceae	Pentarrhinum insipidum	Asclepiadaceae
Commelina benghalensis	Commelinaceae	Portulaca oleracea	Portulacaceae
Commelina african	Commelinaceae	Portulaca quadrifida	Portulacaceae
Commelina imberbis	Commelinaceae	Sesamum calycinum var. Angustifolium	Pedaliaceae
Corchorus olitolius	Tiliaceae	Solanum nigrum	Solanaceae
Corchorus tridens	Tiliaceae	Tribulus cistoides	Zygophyllaceae
Corchorus trilocularis	Tiliaceae	Urtica massaica	Urticaceae
Crotalaria ochroleuca	Papilionaceae	Vatovaea pseudolablab	Papilionaceae
Crotalaria brevidens	Papilionaceae	Vernonia cinerea	Compositae
Cucumis dipsaceus	Cucurbitaceae	Vigna unguiculata	Papilionaceae
Cyphia glandulifera		Vigna membranaceae	Papilionaceae
Digera muricata	Amaranthaceae		

List of indigenous Non-Leafy Vegetables

Species	Family
Balanites rotundifolia	Balanitaceae
Borassus aethiopium	Palmae
Boscia coriaceae	Capparaceae
Citrullus lanatus	Cucurbitaceae
Coccinia grandis	Cucurbitaceae
Dobera glabra	Salvadoraceae
Ficus sycomorus	Moraceae
Hydnora abyssinca	Hydnoraceae
Lageneria siceraria	Cucurbitaceae
Mormodica rostrata	Cucurbitaceae
Moringa stenopetala	Moringaceae
Mushrooms	
Nymphaea nouchali	Nymphaeaceae
Nympheae lotus	Nymphaeceae
Vatovaea pseodolablab	Papilionaceae

Species Whose Leaves are Eaten Raw for Their Acidic Taste

Species	Family
Commiphora rostrata	Burseraceae
Oxygonum sinuatum	Polygonaceae
Rhus natalensis	Anacardiaceae
Rhus tenuinervis	Anacardiaceae
Rumex abyssinicus	Polygonaceae
Rumex bequaetii	Polygonaceae
Rumex usambarensis	Polygonaceae
Tamarindus indica	Ceasalpiniaceae

Species Whose Flowers are Used

Species	Family
Hydnora abyssinica	Hydnoraceae
Nymphaea nouchali	Nymphaeaceae

Appendix 5
Wild Food Questionnaire (Paper 7)

Please gather the following information on wild foods from individuals or groups:

Please give the following information about the person/persons being interviewed: name, sex, age and the name of the region of southern Sudan he/she is from, including county, payam and village. (Note: The person being interviewed should give information pertaining to the region he/she is from. For example, if a person comes from Malualakon in Awiel East, they should only talk about the plant foods used by people in Baac Payam.)

Note: To make it faster to answer the questions, answers will be represented by letters, e.g., T= tree, F= fruit, Y= yes N= no.

Section 1

1. Give the name of the plant in the local language and Arabic, if known?

2. What type of plant is it? T= tree, H=herb, V=vine, G= grass, C=crawler, W= waterplant, S=shrub

3. Which part(s) is/are eaten? T= tuber, F= fruit, L= leaf, S= seed, G = grain, N= nut, G=gum B=bark
(If more than one part of the plant is eaten, such as the leaves and fruit, please answer the questions for each part seperatley.)

4. When is it gathered? Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec

5. When is it eaten?
(Which months is it eaten? This is often a different time from when it is collected, e.g., lalob may be collected in the dry season, but eaten all year round).
Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec.

6. Who gathers it? M=men, W=women, B=boy, G=girl, A=all.

7. Is it a famine food? (Is it only eaten when there is little or nothing else to eat?)
Y/N

8. Who eats it? M= men, W=women, B=boy, G=girl, A= all

9. Is it stored? Y/N

10. How is it eaten? F= fresh, C= cooked

11. Is it sometimes cultivated? Y/N

12. Some of the wild foods are sold or bartered. If this is one of them, who sells or barters it?
M= men, W=women, B=boy, G=girl, A= all

13. Can it be fermented or made into a drink?
Y/N

Section II

Please answer the following questions about each food. Please write the responses on a separate page.

1. How is it stored?
2. How is it cooked/prepared?
3. Which other foods are eaten with it?
4. For a family of five, how much would be eaten at a normal meal? (Give measurement in cups and state which cup is used, i.e., orange cup from feeding centers, aluminum UN cup, tea glass)
5. How is it cultivated?
6. Is it a food eaten in cattle camps, fishing camps, villages, towns, etc.?
7. Where is it sold or traded, i.e., in local markets, town markets, cattle camps, fishing camps, etc.?

Section III – General Questions

1. Are there any special foods for pregnant women? Why?
2. Are there any wild foods that pregnant women should not eat? Why?
3. Are there any wild foods which are said to be good as weaning foods? Why?

Appendix 6
Example of Wild Food Data Recording

Western Flood Plain

Nymphaea sp.

Monjeng: Gor, Abeeth gor, Kei, Diany, Agwi
Arabic:
English: Water lily

Description: Perennial aquatic herbs with spongy underground tubers. Leaves floating on water surface, simple basal, large almost round, reddish underneath, with entire or toothed margin. Flowers are held above water. N. rufescens: has blue flowers, smooth leaves. N. micrantha: leaves slightly undulated marked underneath with violet black dots, has white or bluish flowers. Sepals also marked with purple dots. N. lotus: leaves sharply toothed may have white or pink, blue or yellow tinged petals. Sepals green on black. N.nouchali var. caerulea: has pale blue white below or white petals. Sepals thickly marked with black lines. Found in permanent and seasonal pools, swamps and rivers.

Part: seed/kernel

Harvested: Dec-Jul

Harvested by: women, girls, boys, men

Eaten: Dec-Jul

Eaten by: Women, Girls, Boys, Men

Food use:
Staple: The flower heads are collected and left to dry. The seed is then separated from the flower and dried further. It is then pounded to remove the outer husk. Water is boiled and the cleaned seed is added and cooked for around five minutes, removed from the fire and served with milk, fish or meat. It is a staple food for fishing people who live along the main water courses. Alternatively, it is used as a staple when available in seasonal water courses. The seed, once dry, can be made into a flour and used to make kisera (a thin pan cake). It is also a very useful food in times of scarcity.

Snack: Children sometimes eat the seed raw as a snack.

Storage: It can be stored in the same way as other grains: in pots and baskets sealed with cow dung.

Cultivated, Sold/Exchanged:
Sold/Exchanged: The seed is commonly available in local markets but it is more common to make a specific request for an individual to go and collect seed where upon they are paid on delivery. The price of the seed is cheaper than that of sorghum of maize which makes it a cheaper option as a staple. It is a particularly important source of income for the fishing communities who will sell it to the agro-pastoralist communities.

Cultivated: Although it is not common in some areas, people will clear away the grass growing in the pools; they will also sprinkle seeds in the water.

Part: tuber/root

Harvested: Jan-Jul

Harvested by: women, girls, boys

Eaten: Jan-Jul

Eaten by: women, girls, boys, men

Food use:
Snack: The tubers can be baked in the ashes of an open fire for approximately five minutes, the black skin is cracked off and the tuber inside is eaten, This method of preparation is particularly favored by boys on fishing trips. The tubers are sometimes collected by children and eaten raw.

Staple: For people who live near permanent water courses such as the fishing communities water lily tubers are a staple food source.

Relish: The tubers are collected and washed, they are then boiled, the water is thrown away and the tubers are left to cool. Once the tubers are cold, the black skin is cracked off and the tuber is then eaten. Alternatively, the tuber can be ground up and eaten as a relish. They are often eaten with milk which is a popular meal

in cattle camps. Peeled tubers are also fried in ghee made from cow's milk.

Storage: The roots can be kept for around 10 days after being cooked.

Cultivated, Sold/Exchanged:
Sold/Exchanged: Tubers are sold fresh or cooked in the market.

Notes: The seed and tubers of water lily are commonly eaten in many rural areas of Africa. In Egypt, bread is made from the seed. In South Africa, the tuber is now being sold commercially in tins. Used by the Nuer and Monjenj tribes of southern Sudan for veterinary treatments. (B.J. Linquist, D. Adolph, S. Blakeway)

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Appendix 8

List of Plants with Vernacular Names from Various Areas of Southern Sudan

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Abutilon sp.					Akamca, Ajor, Gemthok		
Acalypha psilostachya							
Acalypha sp.	Um Imerat, El Mahatraba	Chaff flower			Ayak boc, Moracuk		
Acasia senegal							
Achyranthes asper					Athian alur, Kulbek, Jercok,Nya Guom Kar, Tilena		
Adansonia digitata	Tebeldi, Humar, Homeria	Baobab			Dunydud, Zuony		
Alisma plantago-aquatica		Water plantain			Ayictok		
Amaranthus hybridus	tamalaika	Amaranth, African spinach	Quedequede			Quedequede	
Amaranthus sp.	Lissan el Tair Saghi/Kabir, Fiss el Kalb/tamalaika	Pig weed, Amaranth, Bush greens/Amaranth, African spinach	Ocobo	Naboholi, Imojo (imolo), Ing'ari	Amokading, Amokadiong, Amokatied, Kuedekude, Guet	Halitio, Elabu, Hamamiri, Lokubarbar	
Amorphohalus laxiflorus					Leeth		
Ampelocissus africana					Abiec		
Annona senegalensis	Gishta	Wild custard apple, Bullock's heart		Togolac	Yerber, Pac		Madi
Arisaema sp.					Amucok dual, Kumuchan		
Arundinaria alpina		Mountain bamboo					
Asparagus flagellaris					But but		
Asystasia gangetica						Emudu	
Balanites aegyptiaca	Higlig, Lalob	Desert date, Soapberry tree		Kunye	Thou, Apam Thou	Eduti	

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Abutilon sp.								
Acalypha psilostachya		Engolom						
Acalypha sp.			Geresei	Anura				
Acasia senegal								nyedekode
Achyranthes asper					Ruarua, Ngeer, Kow kow			
Adansonia digitata					Geinen, Doin			
Alisma plantago-aquatica								
Amaranthus hybridus		Nequedequede					Kpedekpede	
Amaranthus sp.	Nocobo	Nologuliri	Chobo	Athara	Diong, Murnyadhut, Cuolwiethou, Combok, Buoba, Mokading		Ngiriya	
Amorphohalus laxiflorus				Leeth	Leaw, Leeth			
Ampelocissus africana					Buoc			
Annona senegalensis				Apola		Lamadi	Baghra	
Arisaema sp.				Amucok dual				
Arundinaria alpina			Hisobi					
Asparagus flagellaris								
Asystasia gangetica	Emudo	Nemudo					Tande	
Balanites aegyptiaca	Eduti	Neduti	Eduti	Thau	Thoa, Thoi			nyeronyit

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Balanites glabra							
Balanites orbicularis							
Berchemia discolor						Sikeli	
Borassus aethiopum	Deleib/dileb, deleb, delaib	Fan palm		Sohotoc, Sohotot	Akot, Akan, Agep, Ruuk, Tuuk, Arook Taam, Tuur		Hukihuki
Borehavia erectus	Ararib	Horse Purslane, Black or Giant Pigweed			Tac		
Boscia senegalensis	Mokheit	Shepherd's tree			Akondok		
Bracharia sp.	Um keriat	Bread grass			Akuadha, Akudo, Akut, Amujong, Waac, Apac		
Bridelia micrantha	Gibil				Apiath, Adabadia, Mon apiath		
Butyrospermum paradoxum	Lulu/lulu; Enguru (Imatong)	Shea butter nut/ Sheabutter nut tree	Yaa		Raak, Adien (cake)	Hingmuroi	Kumuri
Cadaba farinosa					Aneet		
Caparis decidua	Tundub				Riaath		
Caparis fascicularis					Ajuet, Abany		
Caparis micrantha					Doya		
Caparis tomentosa					Nyibut		
Capsicum frutescens		Red pepper, Bird pepper		Samurara		Sitata	
Carrisa edulis	Ochuoga (Luo)			Kirihitoc		Acuga	
Carylia adenocaule						Adori	
Celosia trigyna	Danab el Kalib, Danabia/Lobira (Imatong)	Cock's Comb			Malwalawai, Amokatied, Amokadiang, Amokadiak	Elabu	
Celtis toka	Ibnu, Lebinga, Mahagai	Stinkwood/African Celtis			Abyei, Ariek, Leer		
Cissus quadrangularis	Arnik, el salala, Karadis				Arenge		
Clematis brachiata						Amareng	

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Balanites glabra								nyelomae, ngilam
Balanites orbicularis								nyebei
Berchemia discolor								nyemeyan
Borassus aethiopum	Asohoti		Sohoti	Tuwa, Ajueja	Akot, Nor, Donnor, Ciiy, Agep		Akua	nyedukanait, ngidukana
Borehavia erectus				Tac	Cancan	Kubemoro		
Boscia senegalensis				Ubera				
Bracharia sp.					Pac, Muothyiai			
Bridelia micrantha				Colcengok				
Butryrospermum paradoxum	Enguroti	Nenguro	Inguri	Yeu	Riek		Kapari	nyeturukoit
Cadaba farinosa				Alieda	Neet			
Caparis decidua					Riaath			
Caparis fascicularis					Botbot, Kot			
Caparis micrantha								
Caparis tomentosa								
Capsicum frutescens		Naeleyuk						
Carrisa edulis								
Carylia adenocaule								
Celosia trigyna		Nolokibira		Amokadiang	Mandiong			
Celtis toka	Acerahei	Natilahani	Chah(e)i		Riek, Riath, Leer			
Cissus quadrangularis					Deuganai			
Clematis brachiata								

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Coccinia grandis					Malual aluth?		
Colocasia esculenta		Taro, Cocoyam					
Combretum aculaetum					Leplep		
Commelina beneghalensis	Ibrig el Faki, Abu Ibrig, Bayad/bayad/ dueid	Spider wort, water grass, wandering Jew, water grass			Manyok, Manyok Atok, Nyok	Ibotolo	
Commiphora africana							
Corchorus sp.	Kudera, Molukhia/ mulokhia, hodra, kudura, Syrkum (Imatong)	Jute, Jews Mallow, Bush okra		Alanya	Ayaak, Ayitop, Awengdeg, Malok, Marere	Mulukuia	Mulukir
Cordia sinensis					Akoc, Akuei, Akoy		
Cordyla africana					coloic		
Crassocephalum vitellium							Andube
Crateva adansonii					Keec		
Crotalaria sp.				Lohimodo	Cerek	Beneoifuho	
Cucumis sp.	agur, ajur, humeid			Loriamac	Kwol jok, Kwol bor,	Orosoi	
Cyperus esculentus	Seida	Nutsedge, Nutgrass, Tiger nut			Acoul, Athai, Tiec		
Dactyloctenium aegyptium	Um Assabi, Koreib	Crowfoot grass, Egyptian grass, Couch grass			Akuadha, Akudo, Akut, Aquoth		
Datarium senegalenses	Abu Leila	Sweet datock			Akuuddi, Gokkor, Gudi		
Diospyros mespiliformis	Abu Sebela/ lolumbe, abu sebala	Jackal berry, African ebony/ Monkey guava	Cumo		Cum	Hulumi	
Diospyros scabra							
Dipcadi sp.		Star-chestnut			Akurbiok, Akurbiny	Ohuroi	
Discorea sp.		Wild yam			Nganna, Amona, Agony	Hoyai	
Dobera glabra			Olama				
Echinochloa colona	Defra	Watergrass, Jungle Rice, Purple Panicum			Akuadha, Akuath, Rabdit		

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Coccinia grandis								
Colocasia esculenta								
Combretum aculaetum					Laplap			
Commelina beneghalensis	Abalotoli (Huma)	Newoso	Abatala	Nyok	Nyok, Goom, Kotkot			
Commiphora africana								nyekadeli
Corchorus sp.	Ologota	Noloburota / Imoloto		Imolohoto	Udhing	Nyankajang, Mara		
Cordia sinensis					Nyot			nyedome
Cordyla africana								
Crassocephalum vitellium								
Crateva adansonii		Noloduol						
Crotalaria sp.								
Cucumis sp.	Olorose	Nolorote			Peet, Petchibony, Gaera,		Datiro	
Cyperus esculentus					Koydong, Teic, Nydol			
Dactyloctenium aegyptium					Muothyiai, Gop			
Datarium senegalenses				Akutkude				
Diospyros mespiliformis		Elumi	Himi	Cumo	Cum			
Diospyros scabra								nyelimo
Dipcadi sp.					Acurbiok			
Discorea sp.	Aboye	Namayo	Hoyati	Nganna, Agara, Muoda			Bangiongo	
Dobera glabra	Nalama (sg.)/ Nalamati (pl.)							
Echinochloa colona					Bel riaka, Gau, Guak, Muothyiai			

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Echinocloa rotundifolia					Agook		
Ficus glumosa				Hubut	Laac	Ebongoi / Biongi	
Ficus platyphylla	Gameiz/		Olama	Katabalac	Kuel	Ohosei	
Ficus sansibarica		Knobbly fig			Aguercimau, Ngap jur		
Ficus sur Forsk.							
Ficus sycomorus	Gameiz, abu leban	Sycamore fig, Wild fig		Munic	Ngaap		Koluke
Ficus thonningii		Common wild fig, strangler fig			Laac	Biangei	
Flueggea virosa	Guair (arabic)					Ihodoti	
Gardenia ternifolia	Baggis			Taharit	Dong, Lut		
Gardenia sp.							
Grewia bicolor							
Grewia bicolor							
Grewia flavescens		Sand paper raisin			Gwol, Gool, Jooc		
Grewia mollis	abu layok		Pobo	Tiyonit	Apiath		Tiry Tireye
Grewia tembensis							
Grewia tenax	ummageda, gadein, gaddem	Small leaved cross berry		Nyamomo	Apoor, Apormundy		
Grewia villosa	tamr el abid, tukku, mutrak	Mallow raisin		Muguranit	Bath		
Gynandropis gynandra	tamaleika	African Spiderflower, Cat's Whiskers	Akejo	Chabuc	Amokabek, Akiya, Kec nuom		Tegiri
Harrisonia abyssinica	Eleri (Imatong), Pedo (Luo)						
Haxalobus monopetalus					Ludo		
Heteropogon sp.					Cimuc		
Hibiscus sp.	Kakade, Bamia, Weikah	Rosselle, Kenaf, Deccan hemp, Okra	Lage, Malakuang		Thiet, Thoko, Tiam, Tiam ayath, Tiam luat		Loiok, Kiliwir, Kerekede
Holundia opposita			Tutu, Linglakulok			Isamok	
Hyphaena compressa							
Hyphaene thebaica	Dom/Dom; Narohosi (Logir)	Fan palm/Doum palm, Ginger palm			Atuek	Nangorosi	

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Echinocloa rotundifolia					Gogh, Gok, Muothyiai			
Ficus glumosa	Nebonge	Nabiongi		Dhuro				
Ficus platyphylla	Abule	Nabule	Bule	Kwaya, Payoh	Kuel, Beie			nyebuule
Ficus sansibarica				Aguercimau				
Ficus sur Forsk.			Emune			Kulubi		
Ficus sycomorus		nangaboli	naboli	Ulam	Ngop	Koluke	Deroco	nyecoke
Ficus thonningii				Dhuro				
Flueggea virosa		Elaka / Elakat	Ahuyala					
Gardenia ternifolia				Akanya	Gaar			nyekore
Gardenia sp.								
Grewia bicolor								nyekali
Grewia bicolor		Nafarok						
Grewia flavescens					Gaa			
Grewia mollis	Alioto			Apaapa	Ner Kemkai		Kopoyo	
Grewia tembensis								nyegomo
Grewia tenax	Egrum	Netutum			Poor, Porpor			nyengomo
Grewia villosa	Nafarok	Nafarohi						ngapongae
Gynandropis gynandra	Atagiri	Natagiri	Tagiri		Tamaleka, Mokading			
Harrisonia abyssinica		Nahaleri						
Haxalobus monopetalus				Ubar				
Heteropogon sp.					Muothyiai			
Hibiscus sp.				Aruga	Thiet nyang, Thiet, Baroa	Kiliwir	Namba	
Holundia opposita	Lasamok	Lasamok	Esamok				Bomogo	
Hyphaena compressa								nyeturukoit
Hyphaene thebaica	Nagorosi	Nagarohosi	Nagorosi		Tuwa			nyeturukoit

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Hypoxis curculigo					Rok agok, Pajek		
Hyptis spicigera					Nino		
Ipomea sp.	Tabr, Hamtout	Bindweed			Apaat, Akokpiny		
Justicia sp.						Luri	
Kedrostis hirtella					Abuth agook, Abuth diet, Malual gook		
Lannea humulis	Arish, Heyyun				Athoin, Athany		
Lannea schimperi	Amzak, Atab-hassu Ghallub				Dukit, Gumbel, Akoncit		
Lannea schweinfurthii							
Launaea cornuta	Moleita						
Ledebouria edulis					Arueja		
Leptadenia hastata	Abu Leben, Alag				Akuor		
Leptadenia lancifolia	abu leben			kakulic			
Lycopersicum esculestum							
Luffa cylindrica	Olok						
Luffa sp.							
Maerua sp.				Kamok		Hamok	
Maruea sp.					Nguit		
Maruea sp.					Amoyok		
Meyna tetraphylla					Kuec		
Momordica foetida					Kwoljok diet		
Momordica sp.			Hamera	Negigi, Hamera		Himiri / Ihi	
Nauclea latifolia	Angatu		Monyo	Logomtomic	Dhiot, Goat, Miaar		
Nymphaea sp.		Waterlilly			Gor, Abeeth gor, Kei, Diany, Agwi		
Oryza longistaminata		Wild rice			Lop, Lou		
Parinaria curatellifolia							Kele
Parkia sp.	Um Rashad, Mudus	Locust bean tree			Akon		
Pavetta assimilis						Limaoker	
Phoenix dactylifera	Nakhla, belah, tamr	Date palm			Akarap		
Phoenix sp.				Mililac			
Physalis peruviana		Cape gooseberry, ground tomato/ cherry					

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Hypoxis curculigo								
Hyptis spicigera				Nina				
Ipomea sp.				Atelco	Tach yang, Bonbon		Gbhra	
Justicia sp.		Nakolori	Ilurie					
Kedrostis hirtella					Boreal			
Lannea humulis					Thoin			
Lannea schimperi				Akit, Adiang				
Lannea schweinfurthii		Nerwoi						
Launaea cornuta					Yeau, Magak			
Ledebouria edulis								
Leptadenia hastata				Kuor	Nomloc, Mankuor, Nyakajok			nyerui
Leptadenia lancifolia		nahakuri	(H)ahuri		Mankuor, Nyakajok			
Lycopersicum esculestum						Balandora		
Luffa cylindrica							Bakukue	
Luffa sp.							Banganzamu	
Maerua sp.	Amok	Nahamoyok	Amok					
Maruea sp.				Nguet				
Maruea sp.								
Meyna tetraphylla					Kuic			
Momordica foetida								
Momordica sp.	Emiri	Nahimiri	Lohii / Homiri					
Nauclea latifolia	Adoi/Ahode			Muonya	Dhiot, Miaar		Dama	
Nymphaea sp.				Kiya	Tual,Yil, Kei, Guet			
Oryza longistaminata				Lop	Lap, Lep, Poon			
Parinaria curatellifolia							Bandani	
Parkia sp.				Nuana				
Pavetta assimilis								
Phoenix dactylifera					Akarap			
Phoenix sp.								
Physalis peruviana					Butuanyil			

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Piliostigma thonningii	Abu Khamira/khuf el jamal	Camel's foot		Kapokolec	Pac		
Podocarpus sp.		Podo, East African Yellowwood		Doduti		Lohilis	
Portulaca oleracea	Rigila/Rigla	Purslane/Pigweed, Pusley			Lung	Lohorok	
Portulaca quadrifida	Lagab el Hummar, Um Mamleikha				Anuer, Anyuera, Kunor		
Pterocarpus lucens	Taraya	Small leaved blood wood			Dhiek dhiek, Macuar		
Rhus natalensis	selif; Sangla (Luo)						
Rhynchosia sennaarensis						Ekatak	
Rottboellia exaltata		Rice grass			Ayie		
Rytigynia celastroides	Emeni (Logir)			Kurbubit		Kimeni	
Saba comorensis	Abukamira/Mekek		Kuamu			Makek / Mekek	
Salvadora persica	Arak	Toothbrush tree			Acuil		
Sclerocarya birrea	Akamil, hemaidai/ gummel	Marula			Gummel	Likok	
Senna sp.	Sim el Dahib, afun		Oyado	Imotin	Akier	Magui	
Sesmum augustifolium		Wild sesame			Nyuomweng, Nyuom jong		
Setaria sp.					Joljong		
Sida alba	Um Hebiba, Um				Gem thok, Ladha		
	Shidayda						
Solanum americanum	harsch; Alukohi (Imatong)	Black nightshade				Engarak	Role, Asuga
Solanum nigrum			Ocuga	Bobu			
Sorghum arundinaceum	Adar	Wild sorghum			Abaar, Abeet		
Sporobolus pyramidalis	Aish el Far, Tamara el Fahr				Mon, Mol, Tot		
Stathmostelma sp.					Amorog, Aluir		
Sterculia setigera	Baroot,Tartar	Star-chestnut		Hogorec	Boggo, Adhiak	Ohuroi	
Strychnos innocua Del.	hog el fil, umbukesia	Monkey ball		Booka	Dong gud, Gum akon		
Stylochiton sp.					Bargo		

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Piliostigma thonningii	Afafali	Afafali		Upad, Paj	Ngaany, Ngony			
Podocarpus sp.	Ohilis							
Portulaca oleracea				Aliabdiang	Lum koor, Lung, Chim yang, Thial		Sere sere	
Portulaca quadrifida				Anura	Wor		Sere sere	
Pterocarpus lucens				Alana				
Rhus natalensis								
Rhynchosia sennaarensis								
Rottboellia exaltata				Akuek	Diek, Lep yang, Yin, Muothyiai			
Rytigynia celastroides		Nemenio						
Saba comorensis	Amahak	Namahak		Apuoma			Ndavu	
Salvadora persica					Kwil, Pau			nyesckon
Sclerocarya birrea	Likok (Lofi)	Nalikok		Gummel	Kamel, Omel, Gumbel			
Senna sp.	Namagui	Nolofido	Magi / Magui	Akier	Rier			
Sesmum augustifolium			Ohesek					
Setaria sp.					Jual jong, Muothyiai			
Sida alba				Nuyai	Buoba			
Solanum americanum	Nabobi	Nolorongi						
Solanum nigrum				Acuga				
Sorghum arundinaceum					Wath			
Sporobolus pyramidalis					Gau, Muothyiai			
Stathmostelma sp.				Apuna	Luiir, Wer			
Sterculia setigera				Uboga				
Strychnos innocua Del.	Nabolotong	Nabolotong						
Stylochiton sp.				Akaana	Opeal/Katiepe/ Pathiliwich/ Bargo			

Scientific Name	Arabic	English	Acholi	Didinga	Dinka	Dongotono	Kakwa
Syzygium guineense		Water pear, woodland waterberry			Juw, Kuom		
Talinum porttulacifolium				Longoromolok		Lokoromolok	
Tamarindus indica	Ardeib	Tamarind		Motong'it	Cuei	Quatang	Kpite
Tragia plunkenetii							
Tribulus terrestris	Dereisa, gutha dreisa	Puncture vine, Common Caltrops, Devil's thron, Thithorns		Kothohinit	Kuruec		
Triumpheta rhomboidea					Tiam		
Typha sp.					Apeeth		
Urochloa sp.					Akuadha, Akudo, Akut, Aquoth		
Vangueria apiculata	Ghallat el merrisa, Kirkir	Wild medlar			Jooc		
Vigna sp.	Akuem	Wild bean	Boyo		Adulgaak, Gaak, Aquem	Mudes	
Vigna sp.(a)		Wild bean			Akuem jong, Akuem li		
Vitex sp.	Abdugulgul, kurian, undigulgul zeitun,	Black plum, Vitex	Oleyo, Lobia	Nganuma		Halicori	Ligu, Konjuki
Withania somnifera Dunal					Kuaak		
Ximenia americana	Abu Khameir, Ankwi/abu khameir, ankwi; Olemo (Luo)	Small sour plum		Lomac	Melaat		Mala
Ziziphus abyssinica A.Rich.		Ziziphus		Gurumohit	Lang akon	Habei	
Ziziphus sp.	Nabak/nabbak el fil, nabbag	Buffalo thorn, Wait a bit/Ziziphus; Indian plum; Christ's thorn	Lango	Gulic	Lang	Ilangai	

Scientific Name	Latuka	Lokwa	Lopit	Luo	Nuer	Pachulo	Zande	Toposa
Syzygium guineense					Joic?	Kasoram		
Talinum porttulacifolium		Nolokoromolok						
Tamarindus indica		Nequatang	Hata / Ahatei	Cua	Koat		Abanza	
Tragia plunkenetii					Wongrial			
Tribulus terrestris	Nengoroti (pl) / Nengoro (sg)	Nenguere			Chaak, Kotwary			
Triumpheta rhomboidea								
Typha sp.					Peth			
Urochloa sp.								
Vangueria apiculata								
Vigna sp.					Waar, Cholliel jok, Dulgaak, Gaak, Amichour, Nyang kajang, Piin			
Vigna sp.(a)					Ngorjakok, Nguanger.		Korokoso	
Vitex sp.	Ariholi	Nahaligori		Yuola, Atinno	Mony chol		Brikito	
Withania somnifera Dunal					Kuak			
Ximenia americana				Alima		Mala		
Ziziphus abyssinica A.Rich.	Abeia				Bwoa akon			
Ziziphus sp.	Elangi(sg.) / Elangahuo	Nelangiti	Ilonge	Langa	Bwoa		Ngorondima	nyekalaee