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INTERNATIONAL WORKSHOP ON PROCESSING AND MARKETING OF SHEA PRODUCTS IN AFRICA

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Dakar, Senegal
4-6 March 2002



Cover photo: Dried Sheanut for sale on a local market in Adwari, northern Uganda (by Eliot Masters)

INTERNATIONAL WORKSHOP ON PROCESSING AND MARKETING OF SHEA PRODUCTS IN AFRICA

Proceedings of a Workshop held by the Food and Agriculture Organization
of the United Nations, the Common Fund for Commodities and the
Centre de Suivi Ecologique.

Centre de Suivi Ecologique
Dakar, Sénégal, 4 - 6 March 2002

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HOST AGENCY

Centre de Suivi Ecologique, Dakar, Sénégal

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FOREWORD

The international workshop on *Processing and Marketing of Shea Products in Africa*, held in Dakar, Senegal, from 4 to 6 March 2002, provided a forum for the exchange and analysis of information between technical and market experts with a view to evaluate the potential of existing and new applications for processing and marketing of shea products in Africa and beyond.

Source of one of Africa's most ancient food oils, the shea butter tree *Vitellaria paradoxa* is a semi-domesticated, slow-growing tree indigenous to a band of vegetation running for 5000 km south of the Sahel, across 16 African countries from Senegal to Ethiopia and Uganda. Evidence of the utilisation of shea butter, and the shea tree itself, dates back about 4000 years to ancient Egypt. The shea tree was first documented as a high-value commodity in regional trade across West Africa as early as 1354, by the Moroccan traveller Ibn Battuta.

Modern development of the shea tree as a nutritional and economic resource began in West Africa in the 1950s, and has greatly increased in recent years. An estimated 610,000 tons of sheanut were collected across the African shea zone during the 2000 harvest. About ten percent of this production was exported, mainly to Europe and Japan, whereas 545,000 tons were processed locally, into an estimated 131,000 tons of shea butter. The economic exploitation of the shea butter tree has become the object of a dynamic industry, thanks essentially to the spirit of initiative, the physical strength and courage of rural African women.

Early studies attempted to address issues of productivity, but given the long time (10 to 20 years) taken by the tree to reach maturity, lack of continuity over time of research and development efforts has left enormous gaps in our understanding of the biological and environmental factors of shea productivity. Over the past four decades, village-level technologies for improved shea processing have been developed, which have proven highly successful in eastern and central Africa.

It is hoped that the publication of the workshop proceedings in the Series of CFC Technical Papers will contribute to the further development of shea products processing technology and marketing skills for the benefit of the rural poor, and for future generations in rural Africa.



Amb. Ali Mchumo
Managing Director
Common Fund for Commodities

CONTENTS

	Page
<u>SECTION I</u>	
1. OPENING REMARKS	1
Dr. Amadou Mactar Niang Director General, Centre de Suivi Écologique	1
Mr. Edouard Tapsoba Country FAO Representative, Senegal	3
Mr. Mohamed Ramouch Representative of the Common Fund for Commodities	6
Hon. Min. S.E. M. Modou Diagne Fada Minister of Youth, Environment and Public Hygiene	8
Presentation of the Workshop Objectives and Expectations Mr. Shakib Mbabaali Commodity Specialist Commodities and Trade Division, FAO	11
The Shea Resource: Overview of Research and Development across Africa Mr. Eliot Masters FAO Consultant on Shea Processing and Marketing	13
2. SUMMARY OF PRESENTATIONS AND DISCUSSIONS	30
Plenary Session 1: The Shea Resource: Characteristics, Management and Conservation issues	30
Plenary Session 2: Utilization, Processing and Product Quality	31
Plenary Session 3: Trade, Markets and Shea Product Marketing	32
Plenary Session 4: Roles played by the different stakeholders in the karité sector	34
3. REPORTS FROM THE WORKING GROUPS	35
1. Improvement of the Shea Resource: Applied Research and Technical Aspects	35
2. Harvesting and transport, processing and quality control	37
3. Marketing and Commercialisation	38
4. Social Prospects: Access to Resources, Equity of Incomes and Benefits at all Levels	41
4. WORKSHOP RECOMMENDATIONS AND CONCLUSIONS	43

SECTION II

1. PRESENTATIONS	51
<i>The Shea Tree (Vitellaria paradoxa) and the African Shea Parklands</i> Edouard G. Bonkougou	51
<i>Conservation of Shea Parklands through Local Resource Management</i> Joseph Obua, Makerere University	60
<i>Women and the Shea Resource: Issues of Ownership and Producer Equity</i> Marie Diallo, UNIFEM Consultant	67
<i>Strategies for the Conservation and Improvement of the Shea-butter Tree (Vitellaria paradoxa syn. Butyrospermum parkii)</i> Ismaila Diallo and Abibou Gaye, ISRA/CNRF	71
<i>The Benefits of Shea to Rural Households, Communities and Nations</i> Ladi Ziba and Félicité Yameogo	76
<i>Overview of Post-harvest Handling, Processing and Storage of the Sheanut in African Countries</i> Pr. César Kapseu and D. Ngongang, ENSAI	81
<i>Industrial-Level Uses and Quality Control for International Commerce of Shea Products</i> Lars Laursen, AARHUS	90
<i>Equitable Structuring of the Shea Sector: To target the most promising markets</i> Sylvain Matte and Félicité Traoré, CECI	93
<i>Building New Markets for Shea Products: Perspectives from Eastern Africa</i> Eliot Masters, The Shea Project	100
<i>International Standards for Raw and Processed Products, Quality Control and Certification Systems for Exported Products</i> Enrico Casadei, FAO	113
<i>Local Government: The Role played by Government in the Shea Sector</i> Mme Diallo Mah Koné, OHVN	119
<i>Role of Research Institutions in the Shea (Vitellaria paradoxa Gaertn C.F.) Sector: Scientific Experiences and Perspectives</i> Jules Bayala, INERA/DPF	123

2. SUPPLEMENTARY PAPERS (Country Studies) 145

<i>Shea in the North of Côte d'Ivoire: Possible uses, process of transformation and aspects of marketing</i>	145
Nafan Diarrassouba, Abdourahamane Sangare, N'Guessan Kanga Anatole	
<i>Production and Marketing of Shea Products at Ndélé, Central African Republic</i>	153
Flore Mamour, ASFMCA	
<i>Situation of the Shea Sector in Chad</i>	156
Koumaro Mbayhoudel, ITRAD	
<i>Conservation of the Shea Tree Parklands of the Nigerian Humid Savanna through local Resources Management</i>	161
Odebiyi, J.A.; Bada, S.O.; Awodoyin, R.O.; Oni, P.I. and Omoloye, A.A.	
<i>Overview of the intervention of PROMER in the Shea Sector in the Département de Kédougou, Senegal</i>	171
Amadou Souare, PROMER (Sénégal)	
<i>Strengthening the Technical and Management Capacities of Women in the Shea Sector of Zantiébougou (Mali)</i>	185
Koné Mariam Traoré, AMPJ (Mali)	

APPENDICES

Workshop Terms of Reference	191
Workshop Agenda	192
List of Participants and Contacts	196
References	208

***INTERNATIONAL WORKSHOP ON PROCESSING AND MARKETING OF SHEA
PRODUCTS IN AFRICA***

DAKAR, SENEGAL, MARCH 4-6, 2002

OPENING CEREMONY

Speech read by

Dr. Amadou Moctar Niang

Director General of the Centre de Suivi Écologique

Sir, the Minister of the Youth, the Environment and the Health Service,
Sir, the Representative of the FAO in Dakar,
Sir, the Representative of the Common Fund for Commodities,
Sirs, the Representatives of the agencies of international cooperation, our partners in
development,
Ladies and Gentlemen the directors and the heads of national departments,
Ladies and Gentlemen,
My Dear Colleagues,
Dear Guests,

At the very beginning of this opening ceremony, I am obliged on behalf of the Centre de Suivi Écologique to express my thanks to all the partners who contributed to the organization of this workshop. This done, I am pleased to situate this major event in its context, particularly as regards the valuation of natural resources, to fight against the poverty and to facilitate sustainable development.

In this particular area, our workshop constitutes an important stage in a long process of participatory management and development of forests and woodland, initiated by the Government of Senegal with the strong and constant support of FAO. This institution, which has remained faithful to its vocation of support for member states, in the rational management of natural resources, and in association with the Common Fund for Commodities (CFC), has initiated our meeting, and has thus played it a role of the greatest importance.

The Centre de Suivi Écologique feels pride in the confidence of these two prestigious institutions, the FAO and the CFC, which were kind enough to associate themselves with our organization of this important workshop. Our organization is also proud to find itself at the cutting edge of an essential chapter in the environmental policy initiated by the Government of Senegal.

We think of having met the expectations of the international community, thanks to the participation of several Institutions which, on the local level, have organized themselves into a steering committee and worked with the greatest self-sacrifice and in total dedication on the common cause. I would like to mention the Direction of Waters and Forests, ISRA (DRPF), IUCN, UNIFEM, the ITA, PROSEA, the FNRAA and ENDA-GRAF.

Monsieur le Ministre,

I would like to assure you of the positive contribution brought by the colleagues who represented these institutions in our Committee, of whom we request to welcome here today the representatives of about twenty countries and international organizations, and in whom we may be assured of us a quality Senegalese participation, in the various subjects which will be addressed during this workshop.

Monsieur le Ministre,

To end my comments, I would stress the value of symbol which takes on your presence in our works, for a period which we know to be of great potential indeed. We appreciate the value of your time, and recognize the difficulty of your renunciation of other activities of national import in order to be with us here today, to symbolize the significance which the Government of Senegal accords to this International workshop, which has chosen Dakar as its venue. I would like to thank you, once again, for your presence here today, and to greet respectfully the leading personalities, who answered your invitation to participate in this opening ceremony.

I thank you for your kind attention.

***INTERNATIONAL WORKSHOP ON PROCESSING AND MARKETING OF SHEA
PRODUCTS IN AFRICA***

DAKAR, SENEGAL, MARCH 4-6, 2002

WELCOMING SPEECH

Read by
Mr. Edouard Tapsoba
Country FAO Representative, Senegal

Sir, the Honorable Minister,
Sir, the Representative of the Common Fund for Commodities,
Madam, the Representative of UNIFEM,
Sir, the Director of Waters and Forests,
Sir, the Director of the *Centre de Suivi Écologique*,
Ladies and Gentlemen,
Distinguished Participants,

It is a great honor and a real pleasure for me today to wish you, in the name of the Director General of FAO, the warmest welcome to this important regional workshop on the processing and marketing of the shea products, in which our Organization hold the greatest interest. The importance which the FAO accords to this meeting can be illustrated among others, by the number of its technical divisions which have invested several months into the preparations for this event.

Represented here today are the Forest Products Division of the Department of Forestry; the Nutrition Division and the Commodities and Trade Division, both of the Economic and Social Department; the Division of Gender and Development, and the Regional Bureau of the FAO for Africa.

Monsieur le Ministre,

Ladies and Gentlemen;

As Africa struggles to value its resources and improve the living standards of its people, the shea products may be considered as a particularly vital resource in this struggle, both in terms of the potential for technological improvement of its processing, and for the immense socioeconomic potential which the shea resource offers to the populations of certain countries.

The economic exploitation of the Shea-butter tree has been documented as early as the 14th century, and has today become the object of a dynamic industry, thanks essentially in the spirit of initiative, the physical strength and courage of rural African women. Indeed, one considers the 610 000 tons of sheanut estimated to have been collected across the African shea zone during the 2000 harvest. About ten percent of this production was exported, mainly to Europe and in Japan, whereas 545 000 tons were processed locally, into an estimated 131 000 tons of shea butter.

Rarely has an African raw material, while very popular in industrial nations, remained so widely and intensively the object of local initiatives of transformation and valuation. It is advisable now to investigate ways and means to further optimize more the economic benefits of the shea resource to stakeholders at all levels, starting with of the economies of the concerned countries.

Monsieur le Ministre,

Distinguished participants,

If the shea-tree is a promising natural resource to combat poverty and the degradation of the environment, it is necessary to recognize that problems of all kinds exist along the supply chain. Problems exist as well at the level of the management of the resource, at the level of the collection and of the consumption of fruits of the shea-tree and the utilization of its by-products.

Concerning *Vitellaria paradoxa* or the shea tree, the most urgent issues, from our point of view, are the need for clarification of the legal status and the tenure of the resource, its silvicultural organization, and the genetic improvement of the resource.

Aside from these aspects, the pace at which this tree, with its myriad uses, is disappearing in the African parklands - victim of a ruthless exploitation in the interest of short-term financial gain - militates that we raise the alarm from here at Dakar.

Indeed, the Dakar workshop should be a decisive development, in the sense that it should be a basis upon which will allow the relevant publicly-designated authorities to enact the most energetic measures to save the shea tree, including its designation as integral to the national patrimony in the concerned countries.

From the economic standpoint, the techniques of harvest should be intensified, and the marketing of shea products better integrated into the official commercial circuits. Finally, improved technologies for shea processing should be developed in order to increase production and add value to the product.

All this, *Monsieur le Ministre,*

Ladies, Gentlemen,

There are indeed so many paths of reflection upon which, I am convinced, the participants involved in this workshop will focus intensely over the next three days. Considering the depth and variety of the experiences and competences assembled under the auspices of this workshop, I do not doubt that we shall here accomplish an important step in the search for a more remunerative and sustainable management of the shea resource for Africa.

It would be advisable, in the course of our workshop, that effective mechanisms can be found to better involve economic institutions of integration and cooperation, such as the Economic and Monetary Union of Western Africa (UEMOA), the Economic Community

of the States of Western Africa (CEDEAO), that of the States of Central Africa (CEEMAC), Southern Africa (SADC), and the Inter-Governmental Authority for Development in eastern Africa (IGAD).

The regional and sub-regional financial institutions, including the African Development Bank (ADB) with its African Development Fund (ADF) as well as the BOAD, and the other similar institutions in the other sub-regions of Africa, should be involved in a more significant way in the support for the sector.

I would not know how to end my comment without sending, through you, *Monsieur le Ministre*, the profound appreciation of the FAO toward the Government of Senegal, which has so generously agreed to welcome our participants to this important meeting.

Your presence, *Monsieur le Ministre*, in this opening session, in spite of a calendar which we know to be very full indeed, testifies to the great interest which you and the Government of Senegal hold toward the subject of this workshop. Accordingly, I ask you to be our interpreter, for His Excellency Monsieur Abdoulaye Wade, President of the Republic, and Her Excellency Madam Prime Minister, Mame Madior Boye, in order to express to them our profound gratitude.

I would also like to thank the Common Fund for Commodities, for its significant participation and support of the budget of our workshop. Finally, I would like to thank all the partners who responded to our invitation, and have kindly assented to share their knowledge and their experiences in order to contribute to the development of shea resource for Africa.

On behalf of the Director General of the FAO, Monsieur Jacques Diouf, I wish full success to your workshop, and I thank you for your attention.

***INTERNATIONAL WORKSHOP ON PROCESSING AND MARKETING OF SHEA
PRODUCTS IN AFRICA***

DAKAR, SENEGAL, MARCH 4-6, 2002

OPENING CEREMONY

Speech read by
Mr. Mohamed Ramouch
Representative of the Common Fund for Commodities

Monsieur le Ministre,

Ladies and Gentlemen,

On behalf of the Director General of the Common Fund for Commodities, Mr. Rolf W. Boehnke, I am pleased to welcome to you to this Workshop on the Processing and Marketing of Shea Products in Africa.

I would first wish to express my sincere thanks to Senegalese authorities for the quality and the warmth of their reception, and to congratulate our partners, the FAO and the Centre de Suivi Écologique for their excellent organization of this workshop.

Monsieur le Ministre,

Ladies and Gentlemen,

As you are aware, the Shea-butter tree plays a very important role in the economic and social life of the small producers in Africa, particularly for rural women. The importance of the shea resource as an economic incentive toward sustainable resource management and environmental protection is also recognized. It is on the basis of role that the Common Fund for Commodities decided to finance the organization of this Workshop, which undertakes to review the various aspects of this important product.

I would wish now, if you will permit me, to say a few words about the Common Fund for Commodities.

The Common Fund for Commodities is an Inter-Governmental Financial Institution created within the framework of United Nations. The Agreement establishing its creation was negotiated in UNCTAD, and it came into effect in 1989. Today, the Fund counts 104 Member countries of three international organizations, namely the Common Market for the East and Southern Africa (COMESA), the African Union (AU), and the European Community (EC).

The mandate of the Common Fund for Commodities is to promote the socioeconomic development of the small producers of commodities, with the aim of contributing to the development of the society as a whole.

The Fund works on the basis of an approach centered on commodities rather than countries. This approach allows the Fund to solve the problems of commodities in their global context, enabling a number of countries to benefit from the results of each project.

The primary activities of the Fund include measures for commodity development which aim at improving the structural conditions of markets, favoring the competitiveness and the long-term prospects of specific products. These measures include research and development, the improvement of productivity and product quality, the transfer of technology, diversification and processing, improvement of the sectoral infrastructure, facilitation of the initiatives of the private sector, and risk management as regards the prices of commodities.

Project proposals are submitted to the Fund by the relevant International Commodity Bodies. These proposals are studied at the level of the Secretariat of the Fund, and by the Consultative Committee. Projects of determined to be of interest are then subject to the approval of the Board of Directors.

Before concluding, I would like to wish all success to the tasks undertaken under the auspices of this Workshop.

I thank you for your attention.

REPUBLIC OF SENEGAL
One People - One Purpose - One Faith

**DEPARTMENT OF YOUTH,
OF THE ENVIRONMENT AND THE HEALTH SERVICE**

***INTERNATIONAL WORKSHOP ON PROCESSING AND MARKETING OF SHEA
PRODUCTS IN AFRICA***

DAKAR, SENEGAL, MARCH 4-6, 2002

KEYNOTE ADDRESS

Read by

Hon. Min. S.E. M. Modou Diagne Fada
Minister of Youth, Environment and Public Hygiene

Sir, the Representative of the FAO in Dakar,
Sir, the Representative of the Common Fund for Commodities,
Your Excellency, the Ambassador of the Netherlands in Senegal,
Sirs, the representatives of the partners in development and the agencies
of international cooperation,
Sir, the Director General of the Centre de Suivi Écologique,
Ladies and Gentlemen, the directors and the heads of national departments,
Ladies and Gentlemen, the participants,
Dear Guests,

It is a great pleasure for me to preside, on behalf of the Government of Senegal, at the opening ceremony of this International Workshop on the Processing and Marketing of Shea Products in Africa.

It brings me all the more pleasure to address questions relative to the management of natural resources, and to the conservation of woodland species of economic importance such as the Shea-butter tree in particular. These issues constitute a major concern of His Excellency Monsieur Abdoulaye Wade, President of the Republic and the Government of Senegal, and his Prime Minister Madame Mame Madior Boye. In consequence, the shea resource of Senegal - situated in the western limit of the area of distribution in Africa - deserves special attention today.

Indeed, the environmental dimension is integral to the conception and elaboration of the economic and social development policy of Senegal, according to the recommendations of the Conference of United Nations on the Environment and the Development collectively called The Earth Summit, held in Rio de Janeiro in June, 1992. This policy is based on the rational management of natural resources in the perspective of the sustainable development. The productive value of the shea resource should be recognised as an asset in the fight against the desertification, the conservation of biodiversity, and the

control of the greenhouse gases through carbon sequestration in woodland biomass, providing a livelihood and adding value to the living environment of the rural populations.

To this end, the Government of Senegal established the National Commission for Sustainable Development (CNDD), charged with integrating these various environmental concerns into programs which address development objectives including education, health and the fight against poverty.

In addition, our country has endowed itself with tools for economic planning through the National Environmental Action Plan, the various plans and the sector-based programs among which the National Program of Action of fight against the desertification, the National Strategy for the Conservation of the Biodiversity, the National Strategy on the Climatic Changes, the Land Action plan for the sustainable management of natural resources, and the Action Plan for the Environment. These tools have been reinforced by legal and statutory instruments such as the code of the environment, the forest code, etc.

Ladies and Gentlemen,

Senegal is confronted with serious degradation of natural resources, in particular woodland resources, a consequence of increasing demographic pressure, with correspondingly increasing food and energy needs to satisfy, under increasingly consistent conditions of drought. In such a context, it would seem important to focus on strategies which can serve to reconcile the imperatives of conservation and sustainable management of natural woodland resources with human nutritional and economic requirements.

The evolutionary approach, which characterizes the forest policy cannot succeed sustainably without the participation and involvement of rural populations. A new perspective recognizes empowerment of rural populations as a necessary first step toward sustainable management of woodland resources, in the context of integrated agricultural and pastoral activities.

However, this necessity of placing communities in the center of the process, must be supported by a total commitment of the technical services, which should continue to provide indispensable technical support, competence and existing expertise in management of forest resources. It is evident, too, that the respect for the existing statutory instruments by all the actors constitutes an essential precondition upon which to base effective and sustainable interventions.

It is in this context, rural populations can more fully benefit from renewable woodland resources. Indeed, non-wood forest products play an important role in the state economy. Among these products is the shea tree, the importance of which is not limited to Senegal, but extends throughout the sub-region.

Improved management of the shea resource, which can bring sustainable benefits and inestimable profits, should be undertaken in close collaboration with the concerned stakeholders. It should also be based on a resource inventory and assessment in order to

facilitate sound management of the resource in order to satisfy the priority needs rural communities, and the nation as a whole.

The African shea-producing countries, taken individually, have no technical, human and financial means to face the threats which pressure the integrity of forest and woodland genetic resources. It is thus both necessary and urgent to establish mechanisms of cooperation to guarantee the protection of these resources - the ultimate purpose of which will be to fight against the rural poverty, particularly through increased incomes for rural women, traditional custodians and primary stakeholders of the shea resource across Africa.

To increase the value of the living shea tree and enhance the organization of the shea sector will require an intensification of the scientific, technical and financial capacities of the producing countries, but also the collaboration of the various actors and institutions which support the transfer of technology. One objective of this meeting should be to build upon opportunities of collaboration with regional and international organizations.

I am confident that, at the end of the day, concrete propositions in organization of the shea sector and the sustainable management of the shea resource will result from this workshop.

Ladies and Gentlemen,

Your workshop is held just as the African countries have agreed to establish an Innovative Plan aiming at promoting a new partnership between the African countries and the rest of the world, namely the New Partnership for African Development (NEPAD). This plan, of which one of the founding fathers is His Excellency President Wade, was conceived by the Africans according to their own priorities, and in response to constraints connected to the financing of development in Africa, considering the environment as one of its priority areas of activity. I am convinced that the conclusions of your workshop contribute to the preparatory documents of the Action Plan.

Ladies and Gentlemen,

I would like to send my deep thanks to the FAO for its initiative, and to the Common Fund for Commodities for their support of the organization of this meeting. I thank the FAO for especially having raised the profile of the shea tree among the international community.

Different experts have been mobilized to enhance the technical capacities of African shea-producing countries to develop this resource and achieve a sustainable development through the exchange of information, ideas and experiences. I am confident that this workshop will ultimately allow the establishment of a dynamic and fertile partnership among all the actors of the field.

By wishing full success to the task before you, I declare open this International Workshop on the Processing and Marketing of Shea Products in Africa.

I thank you for your attention.

***FAO/CFC WORKSHOP ON SHEANUT PROCESSING AND TRADE IN AFRICA
DAKAR, 4-6 MARCH 2002***

OPENING REMARKS

Presentation of the Workshop Objectives and Expectations

**Shakib Mbabaali
Commodity Specialist
Commodities & Trade Division, FAO**

Thank you Mr Chairman.

Hon. Minister,
Mr Tapsoba – FAO Representative to Senegal,
UNIFEM Representative,
Ladies and gentlemen,

I would like to start by welcoming all of you to Dakar for this very important workshop and for those of you that do not reside in Senegal I hope you had pleasant flights from your respective locations to Dakar.

Secondly, I would like to thank the workshop organising committee members who have worked tirelessly to ensure that this workshop takes place and the fact that we are all gathered here today is testimonial to their efforts. However, this has not been without its challenges especially in the logistics area. To that end, and on behalf of the organising committee, I would like to apologise to all those that might have been inconvenienced, in one way or the other, in the process of getting you from your homes to Dakar.

Now that the organising committee has brought us here together, the outcome and overall success of the workshop will depend on the contribution of all of us – the presenters and the rest of the participants. I am confident that the presenters will give interesting and informative presentations and I also hope that the audience will actively participate by asking insightful questions and/or by asking for clarifications where necessary. By doing so, we will shape the way forward regarding the different problems and/or opportunities facing the sheanut industry.

With that preamble, I would like to briefly remind you of the general objectives of this workshop and these include:

1. to evaluate past experience in production, processing and marketing of sheanut at the local, regional and international level;
2. to identify key constraints and potentials in production, processing and marketing of sheanut at the local, regional and international level;
3. to formulate strategies to enhance processing, utilization and marketing of sheanut products in a sustainable manner;
4. to review the available options;

5. to identify priority areas of intervention and possible follow-up activities; and
6. to disseminate as widely as possible the information gathered and the results produced by the workshop.

Main issues expected to be addressed during the workshop include:

1. the reliability and renewal of the sources of supply;
2. resource and equipment requirements;
3. improved and locally adapted processing and storage methods and their transfer to users;
4. organisation of small-scale producers, processors and traders;
5. opportunities for public-private partnerships;
6. means to develop local and regional markets and market information networks;
7. the role played by women in the production, processing and marketing of sheanuts and products; and
8. the role of research institutions, state agencies and donors (and how their interventions can best assist small-scale producers and facilitate market access).

At the end of the workshop, we hope to achieve the following:

- 1) establishment of contacts among and between experts, research institutions, NGOs and other stakeholders involved in sheanut production, processing and trade;
- 2) identification of constraints hindering progress in the improvement of processing and marketing of sheanut products;
- 3) identification of priority areas of intervention and possible follow-up activities; and
- 4) preparation of workshop proceedings (comprising papers presented, main findings and recommended strategies) and disseminate them to all concerned parties.

With that, ladies and gentlemen, I will now take any more time and wish you a very fruitful workshop and thank you for listening.

Thank you Mr Chairman.

The Shea Resource: Overview of Research and Development across Africa

Eliot Masters

Consultant to FAO on Shea Processing and Marketing

ABSTRACT

Source of one of Africa's most ancient food oils, the shea butter tree *Vitellaria paradoxa* is a semi-domesticated, slow-growing wild fruit tree indigenous to a band of vegetation running for 5 000 km south of the Sahel, across 16 African countries from Senegal to Ethiopia. The development of the shea tree as a nutritional and economic resource began in West Africa in the 1950s, and has greatly increased in recent years. Nevertheless, significant technical questions remain, and the great potentials of the shea tree have yet to be realised across the shea parklands. Recent opportunities for producers and other stakeholders to meet and exchange information have led to very constructive interactions, and form a foundation for effective regional development of the shea resource.

Categories of Shea Research and Development:

- A. Ethnobotany and Economic Botany of the Shea Tree (*Vitellaria paradoxa*)
- B. Shea Resource Diversity and Domestication
- C. Technical Improvement of Shea Processing
- D. Market Development of Shea Products
- E. Networking for Development of the Shea Resource

INTRODUCTION

The natural range of the shea tree *Vitellaria paradoxa* extends from southeastern Senegal to the Ethiopia and Uganda. Across the range, the shea tree is highly valued for its fruit (which provides a source of protein and carbohydrates during the annual 'hungry season'), and its kernel, source of the traditional food oil known as shea butter. The shea tree is treated with great reverence by all the traditional societies who have long lived with the tree.

The ironstone savannas on which the shea tree thrives are cultivated with indigenous grains (sorghum, millet) and pulses (pigeonpea, cowpea, bambara groundnut), and a great variety of wild and semi-domesticated food plants, including the shea tree. The farmed parkland system has been described as 'anthropic' in that its species diversity reflects selection pressure closely related to human utilisation (Pullan, 1974).

Evidence of the utilisation of shea butter, and the shea tree itself, dates back about 4000 years to ancient Egypt. The shea tree was first documented as a high-value commodity in regional trade across West Africa as early as 1354, by the Moroccan traveller Ibn Battuta, then again in 1799 – more than four centuries later - by Mungo Park. Despite the long history of the shea resource, many significant technical questions remain.

Research and development of the shea resource began nearly a century ago, in the former French and British colonies. Early studies attempted to address issues of productivity, but given the long time (10 to 20 years) taken by the tree to reach maturity, lack of continuity over time of research and development efforts has left enormous gaps in our understanding of the biological and environmental factors of shea productivity.

The recent INCO Parklands Project (Improved Management of agroforestry Parkland Systems in Sub-Saharan Africa) has brought together research institutions and implementing organizations in Burkina Faso, Mali, Nigeria and Uganda, in order to address critical issues of applied research on the shea tree, and the parklands system. The four year project concludes in September 2002, and while much work remains, initial results of the project are very useful and will be discussed further in this paper.

Traditional methods of shea butter extraction are highly arduous, requiring high inputs of female time and labor, fuelwood and (head-carried) water. The productivity of traditional processing methods is quite low, and product quality is highly variable, depending upon the skill and attention of the processor. Balanced against local prices for shea butter, the cost of production by input-intensive traditional processing methods often outweighs the returns, due to low farmgate prices for shea butter (Masters, 1992).

Over the past four decades, village-level technologies for improved shea processing have been developed, which have proven highly successful in eastern and Central Africa. Despite a longer-term investment in technology development in West Africa, much work remains to adequately address West African technical requirements, due to the harder consistency (higher stearin to olein ratio) of the West African *paradoxa* subspecies.

Work on the applied research and technical aspects of the shea resource have gained momentum across Africa during the past decade, the past few years in particular.

The greatest significance of this workshop, in my opinion, is the historically unprecedented opportunity we are given by it, to take collective action to address critical issues of processing, marketing, and development of the shea resource for the benefit of the rural poor, and for future generations.

The following text contains numerous citations to the literature; these references are included in a list appended to this document. As will be noted from the citations, the two 'peaks' in the abundance of shea literature were during the 1950s (mainly from French colonial West Africa), and again since the 1980s, particularly in Burkina Faso, Mali and Uganda. It should be noted that the most comprehensive single reference on the shea tree remains the monograph published by the University of Wales, Bangor (Hall *et al.*, 1996), which adequately addresses the parameters of the resource, and is likely to remain unsurpassed for years to come.

ETHNOBOTANY AND ECONOMIC BOTANY OF THE SHEA TREE **(VITELLARIA PARADOXA)**

Ethnobotanical studies of shea have been conducted across the range of the tree, starting in the earliest colonial literature, becoming more abundant and detailed in recent decades.

Studies by Bognounou (1988) and Bratcher (2000) are particularly extensive, for Burkina Faso and Uganda respectively.

Chevalier (1946) extensively covered the ethnobotanical aspects of *Vitellaria* across its range. The first comprehensive study of the ethnobotany and economic botany of shea was published by Ruysen as a series in *l'Agronomie Tropicale* (1957), with a focus on West Africa. (Ruysen's account still stands as a seminal reference on *Vitellaria*, followed in scope only by Edouard Bonkougou's 1987 monograph, and the 1996 monograph (Hall *et al.*) mentioned above.

The ethnobotany of the shea tree has been covered in a great number of documents with a national focus; aside from work by Ruysen and Hall *et al.* cited above, there has been no attempt to draw these studies together under a regional perspective.

Many studies have addressed the ethnobotany of *Vitellaria* in the broader context of the parkland system, in which the tree is one (very significant) savanna woodland species of many which provide sustainable rural livelihoods to communities across the shea zone. A particularly extensive parkland ethnobotany, for Ghana, is Abbiw (1990).

The parkland system has been called "anthropic" (Pullan, 1974) in that it is characterised by human activity and selection, with a fluid interface between wild and semi-domesticated food species and traditionally cultivated crops. Recent food-crop introductions (e.g. maize or cassava) are secondary in importance to indigenous sorghum and millet varieties, often supplemented with indigenous pulses. Other oilseeds (e.g. sesame and groundnut) are eaten intact, while food oil comes primarily from the shea tree, a semi-domesticated species strongly associated with human settlements.

Dr. Jean-Marc Boffa, currently of ICRAF, has covered the parkland system extensively from a regional perspective in his recent and comprehensive study, *Agroforestry Parklands in Sub-Saharan Africa* (1999).

SHEA RESOURCE DIVERSITY AND DOMESTICATION

Resource assessment

It has been commonly observed across the African shea zone that the shea tree yields best – and earliest – when it is protected by cultivation. Throughout the region, shea tree densities are closely linked to human populations (or *vice versa*). In fallow, the incidence of protected trees of different species of various sizes indicates a strong correlation between conservation and the productive value of a given species.

Many estimates of shea tree frequency and relative densities, including regeneration data, have been put forward across the shea zone. However, it is not easy to compare data from across the region as parameters (e.g. size classes) have been measured using different methodologies (see Bonkougou, 2002 in this publication).

In northern Uganda, studies of size-class distribution of the shea tree indicate that regeneration is responsive to market conditions which increase the profitability of production and open market opportunities for the primary producers (PROPAGE, 2001).

Regeneration is affected primarily by protection of young shea trees when clearing land for cultivation, purely a question of economic utility. As with other woody species, the protection of each individual tree is based on a calculated long-term investment of extra cultivation time and crop productivity lost – based on the hypothetical productive value (decades in the future) of the mature shea tree.

Resource mapping of *Vitellaria* is an important management tool, and may ultimately resolve the problems estimating productivity for a given area. Accurate maps of the shea resource and its relative densities are essential to effective planning and resource monitoring.

Langdale-Brown, Osmaston and Wilson (1964) produced a beautiful vegetation map of the shea savanna in Uganda, which remains relatively accurate and useful to the present day. Other scattered maps (some very rough) exist of the shea zone in other countries, but none has been produced as yet to include the shea zone from a regional perspective, or to document relative densities with consistency, accuracy or precision.

According to recent research in the West African parklands (Franklin *et al.* 1991), there are indications that each savanna tree species, *Vitellaria* inclusive, emits a distinct electromagnetic signature in reflectance of solar radiation by its leaf cover. Given the resolution of existing satellite technology (e.g. SPOT), it should be feasible to construct a geographic information system based on remote data (and a minimum of ground truthing) to document the distribution and frequency of shea resource across its range.

Resource mapping should be addressed as a priority in each of the producing countries, as a basis for effective planning, monitoring, and sustainable resource management.

Yield monitoring

Annual yield monitoring of *Vitellaria* began in the colonial era, but has not continued for more than a decade at a time in any given location, leading to compromising gaps in the data.

The task of yield monitoring is greatly complicated by the difficulty in measuring the production of each tree, which to date has only been attempted using one of two methodologies:

- Estimated yield (guessed) at through on-the-ground fruit counts of branches, with considerable extrapolation and guesswork.
- Documented yield, based on the active participation of a local farmer, who must collect each fallen fruit, but not mix the harvest from a particular tree with that from any other.

Given the difficulties inherent in either methodology, maintaining the consistency and accuracy of yield monitoring for a given population (20 to 200 trees) over time is a difficult prospect indeed.

Productivity studies have been conducted in at Katibougou, Mali as early as 1911 (Ruyssen, 1957), at Ferkessedougou, Ivory Coast and Saria, Burkina Faso as from 1935

(Delolme, 1947; Desmarest, 1958) and more recently (and rather extensively) at Thiougou, Burkina Faso (Boffa *et al.*, 1995) and in Uganda (Masters, 2000).

However, given different methodologies and specific methods used in these studies - and the natural inconsistencies of production of a given tree during a given year - it is not surprising that the 'average' fruit yield ranges widely, between estimates of 2 and 20 kg of dry sheanut per tree per year.

The biological and environmental factors affecting annual productivity of shea are not yet well understood, but there appears to be a rather complex correlation of yield with precipitation and soil moisture during the flowering and fruiting phases of a given year (favoring a dry flowering followed by a wet fruiting).

Though there are 'good' and 'bad' years for shea in a given area, the variability in yield between individual trees on any given year is also extremely high – as it is for the same tree during consecutive years. Local people who live with the tree speak of a 3-year cycle of productivity; a low yield followed by a high yield followed by a medium yield, followed by a low yield (and so on), but this has not been verified scientifically through yield monitoring over time.

Parkland plant biodiversity: associated species of *Vitellaria parkland*

Botanical inventories across the range have documented the inter-species biodiversity of the parkland system, with attention to regeneration of the shea tree and other useful species in fixed plots under cultivation and fallow.

One of the common results of these studies is an understanding that there is very little vegetation which can be characterised as 'natural' or 'wild' in the parkland system; human activity and selection are so integral to the parklands system that 'long term fallow' is a far more accurate term than 'bush' to describe savanna woodland of diverse species composition and complex population structure.

Regeneration studies of shea as compared to its associated woody species of the shea parkland have been conducted in Burkina Faso by Jean-Marc Boffa for his doctoral research (1995), by COVOL in Uganda from 1999-2000, and currently by Wageningen University under the INCO Parklands Project.

As with the shea population and density estimates discussed above, it is not easy to compare regeneration data from across the region, as different parameters have been measured using different methodologies (Discussed in Bonkougou, 2002, in this publication).

Diversity within *Vitellaria*: selection based on favored characteristics

The close correlation between the shea tree and human activity has been widely noted; indeed, it is possible to speak of the tree as a 'semi-domesticated' species, being 'improved' over time through a process of passive selection. Though not normally planted by farmers given its long time to maturity, regeneration of the species is facilitated by human management, both by covering germinated seeds with mulch, and

through protection of the shea seedling (along with other useful species), when clearing land for cultivation.

Protection of individual trees is based on a set of productivity criteria held by local farmers, including total productivity, consistency of yield over time, fruit type, nut characteristics, and even oil content. The favored characteristics of farmers in Burkina Faso, Mali, Nigeria and Uganda have been documented by the Centre National de Semences Forestieres (CNSF), the Institut d'Economie Rurale, the University of Ibadan and COVOL Uganda respectively, under the INCO Parklands Project.

Recent diversity-related data collected and analyzed under the INCO parklands project, and information exchanged at this workshop, has brought out critical questions of continuity of the resource from Nigeria to the eastern edges of the range.

An old botanical question of subspeciation within *Vitellaria* – whether and how many – has come up once again. Documented levels of intra-species diversity within both (currently recognised) sub-species *paradoxa* and *nilotica* is so pronounced as to compromise the current classification system of the species.

Given botanical and genetic uncertainties, it is not yet known to what extent the differences in composition of shea butter across the range are determined by either (or both) environmental or genetic factors.

The physical and chemical properties of shea butter from Central African Republic, and descriptions of processing techniques in Chad, indicate that the “subspecies” *paradoxa* may not extend to Sudan as previously thought. Instead, it seems possible or even likely that an even gradient of botanical diversity exists between the West African and the Eastern populations, with considerable intra-species biodiversity across the range of the tree.

This question may be at least partly resolved in the coming year by the Centre International de Recherche en Agronomie pour le Développement (CIRAD), France, a partner in the INCO Parklands Project. Through CIRAD's RAPD genetic studies, diversity within *Vitellaria* is being ‘mapped’ across the range. The RAPD method tracks specific genetic markers through PCR amplification of (GA) microsatellite sequences in DNA harvested from leaf samples.

According to CIRAD's analysis of data collected thus far, the Uganda *Vitellaria* population has been proven to be distinctly isolated genetically from the western range, but data is currently lacking from Central Africa (Chad and Central African Republic in particular).

Also under the INCO Parklands Project, the practical applications of diversity within *Vitellaria* are being documented in further detail through fatty acid profiling and chemical analysis by the Institute for Applied Research at Ben Gurion University (IPALAC) and the Istituto Sperimentale per la Elaiotecnica, Pescara, Italy. The final results of this work, and of the genetic work done by CIRAD, are expected in October 2002.

Propagation and reduction of juvenility

Given the long (12-25 year) period before the first fruiting under natural conditions, the reduction of this juvenile period in *Vitellaria* has long been sought. Vegetative propagation of *Vitellaria* is greatly complicated, however, by the latex sap of the tree, which quickly seals off the transpiration vessels of any cut surface.

Grafting techniques are not simple, and have not greatly exceeded the original 25 percent success achieved during the 1970s and 1980s by André Grolleau in Burkina Faso (Grolleau, 1989). Under the INCO Parklands Project, the Centre National de Semences Forestieres (Burkina Faso) has achieved a 28 percent survival rate using a chip budding method. The Institut d'Economie Rurale, Mali, has also conducted grafting work during 1999 and 2000, with only moderate success.

Propagation by rooted cutting techniques has met with greater success, particularly in Ghana, where 80 percent survival rates have been achieved (Opoku-Ameyaw *et al.*, 1997, *in* Boffa, 1999). Rooting methods were evaluated in by COVOL Uganda in 1999-2000, but with very low rates of survival. More extensive trials, including grafting, are scheduled later this year (2002).

Selection and propagation work on the shea tree by BELACD, an NGO operating in the Sahr region of Chad, is also reported to be in progress.

Conservation and management of *Vitellaria* by farmers

Management of *Vitellaria* by farmers has been covered extensively in the literature, consisting mostly of area-specific case studies.

Under the INCO Parklands Project, the effects of pruning on fruit yield is being studied by the Institut de l'Environnement et de Recherches Agricoles (INERA), Burkina Faso. The effects of the African Mistletoe *Tapinanthus* spp. and possible management strategies for its control have been addressed by Drs. George Salle and Joseph Boussim at the Université Pierre et Marie Curie, France, and by partner institutions in the INCO Parklands Project countries (Burkina Faso, Mali, Nigeria and Uganda).

Also under the project, farmer management practices affecting the shea tree have been documented and analyzed in detail in Burkina Faso, Mali, Nigeria and Uganda by Dr. Armelle de Saint Sauveur of the French NGO Propage.

Based on results from Uganda, Dr. de Saint Sauveur concludes that higher profitability to the primary producers under the COVOL Shea Project in Uganda has directly led to management decisions by local farmers which promote regeneration of the species, particularly by protection of young shea trees when clearing land for cultivation.

In sub-Saharan Africa, nearly all decisions affecting the ecological integrity of a landscape are made at the local level, by the farmer. Rural livelihoods are determined through shrewd calculation, and only the hard relative value of a given application (tree as food source over time *versus* the tree as charcoal) will determine the outcome of any such decision. Research results suggest that only through increasing profitability to the

primary producers and their households will these local decisions tend to favor the future of the shea resource.

TECHNICAL IMPROVEMENT OF SHEA PROCESSING

Sheanut collection, drying and storage:

Collection

Sheanut harvest is a straightforward affair, consisting of simple collection of ripe fruits from the ground. Collection may be enhanced through increased access to transport, and by controlled ('quiet') burning of grass by farmers early in its season, when it is relatively short, and just prior to flowering of the shea tree.

Following harvest, the pulp is best removed for consumption, or for pounded, dried, and kept for household consumption or sale. In areas where the tree is very abundant, traditional methods of pulp removal have sometimes included a fermentation process in an earthen pit. Though the high temperatures of fermentation may help to denature growth enzymes, killing the seed and minimising enzymatic oxidation, the fermentation process may also taint the kernels with an unpleasant odor. Fermentation is now discouraged due to this risk of contamination.

Parboiling

In some parts of West Africa, shea seeds are parboiled in the shell immediately following harvest in order to kill seed growth enzymes, and to facilitate sun-drying of the nut before the shell is removed (or the seed is stored intact in its shell). Parboiling requires a great deal of fuelwood, with corresponding impacts on the environment. Parboiling is not practiced in Eastern Africa, where the whole seed is dried in the sun for about two weeks, during which time the shell is usually removed, before storage.

Manual and powered decorticators for mechanical shelling of shea seeds have been developed in West Africa, based on technology used to shell groundnut.

Drying

Given the seasonal concurrence of the annual shea harvest with the onset of the long rains, attention and time invested in careful drying of sheanut is quite critical to the quality of the final product. Any measure of neglect in the drying process can easily lead to rapid and complete contamination of sheanut with fungus, in some cases leading to secondary infection by bacteria.

Enhanced drying of sheanut has been addressed through a variety of methods, starting in the 1950s with the development in Burkina Faso of wood-burning dryers based on traditional methods of smoking sheanut above a fire (Servant *et al.*, 1956; Bagot, 1958).

Traditional methods of drying of shea seeds over fire or hearth (smoking) of sheanut, whether shelled or unshelled, can never be recommended as a drying method, as it greatly

reduces quality of the finished product through contamination by hydrocarbons and more toxic chemical compounds.

Methods of solar drying have been developed in Burkina Faso (Terpend, 1992), in Cameroun (Kapseu *et al.*, 2000) and more recently in by the NGO Technoserve Ghana (Antwi, 2000). In December 1999, the University of Ngoundere (Cameroun) held a workshop on the drying and improvement of shea and canarium (Kapseu and Kayem, 2000).

Generally speaking, the more affordable solar driers, being based on polythene sheeting – have a very limited durability, and may require repair or replacement more than once in a season due to degradation of the clear polythene by UV radiation and general use. The economic utility of solar drying versus the more labor-intensive traditional method must be decided according to local conditions.

Storage

Over the past few decades, polythene produce bags or sacks have come into wide use for storage of shea kernels - particularly in Eastern Africa - with harmful effects upon the condition of stored sheanut. The tightly woven plastic mesh does not allow free circulation of air, and condensation of kernel moisture over a diurnal temperature gradient stimulates development of fungal spores leading to rapid contamination of the stored sheanut. The situation is made all the worse by the fact that the bags are often stored directly on the earthen floor of a house.

Extension training curricula used by shea development projects in eastern Africa recommend the use of traditional storage methods, *e.g.* home granaries or baskets stored off the floor (Masters, 2001). In West Africa, in addition to traditional granaries and baskets, jute bags from the cocoa industry are more widely available; jute fibers allow air flow to regulate moisture levels, but must be stored at least 25 cm off the floor.

Sheanut selection and grading

A recurrent obstacle to product quality control and market development is the current lack of commonly accepted standards for sheanut quality. Producers rely on sheanut from a widely dispersed supply network of individual collectors, who use a wide variety of storage methods, often unsound. Given low farmgate prices for sheanut, farmers have little incentive to invest their time and labor in sound drying and storage practices which ensure a higher-quality product.

Sheanut infested with fungus or other contaminants may be washed or boiled to disguise its condition, but this obfuscation may be detected by the practiced eye. Of course, any contamination by fungus is permanent and irreversible, regardless of the superficial appearance of the nut.

Fungal haustoria remain in the nut through any attempt at cleaning, and their digestion process rapidly degrades the lipid fraction of the kernel, leading to high levels of free fatty acids (FFAs), a bitter taste, and an unstable product prone to more rapid anaerobic

rancidification. The grinding of infected sheanut can also contaminate the grinder, and future production.

Clean, but cracked and time-darkened (partially oxidised) nuts should be roasted prior to extraction of food-oil, as roasting helps to clarify the oil by denaturing kernel proteins, thus partially binding contaminants.

In eastern Africa, a sheanut grading system has been developed and adopted by producers, consisting of four quality grades:

Grade: Characteristics:

- A. Clean and dry light-colored sheanut of first quality, suitable for cold-pressing for food oil and cosmetic and export applications.
- B. No evidence of contamination, but some darkening of nuts, cracking, limited insect and/or rodent damage. Bad nuts can be sorted out, remainder suitable for roasting and (hot-pressed) extraction of food oil.
- C. Nuts dark and many cracked, insect and/or rodent damage evident. Bad nuts can still be sorted out, remainder used to extract shea butter for soap-stock.
- D. Nuts dark and cracked, with extensive insect and/or rodent damage and fungal contamination evident. Bad nuts cannot be sorted; nuts must be discarded, or sold to less discriminating buyers at a greatly reduced price.

Shea butter extraction

Traditional methods of shea butter extraction are highly arduous work for women. The required inputs of traditional extraction methods include women's labor, water (which must be collected carried by women) and fuelwood (also collected by women, and carried over greater and greater distances as the resource disappears). The quality of the traditional product is highly variable, ranging from perfect and clear to rank with contamination.

Development of improved 'village level' or artisanal technologies for the rural extraction and processing of shea-butter began in Burkina Faso in the 1950s (Bagot 1958), and in Mali during the 1960s (Duplan *et al.*, 1965).

A long line of prototypes and several generations of hand-presses have been since been developed, particularly in Mali (Kranz-Plote and Spenk, 1987, and Hyman, 1991), Burkina Faso (SNV, 1992 and 1995, and Tigasse, 1998), Ghana (GRATIS, 1998) and Uganda (Kisakye *et al.*, 1997; COVOL, 2001).

While earlier manual press designs employed a hydraulic jack to distribute pressure to the press-cage, this was found to be problematic as the jack required regular replacement (Hyman, 1991). Current hand-press designs are based the screw block design, which is more durable, but requires care in operation maintenance to protect the threaded shaft and screw-block.

Other accessory equipment developed for use in conjunction with the hand-press includes decorticators (shelling machines), grinding machines (also known as plate grinders or

maize mills), roasters, and mixing machines meant to facilitate a semi-mechanized version of the West African ‘kneading’ method of extraction.

Alternatives to the manual press method include the motorized hydraulic press, and the centrifugal extraction system first developed by the French NGO CEPAZE in Mali (PRTT, 1984 and Hyman, 1991), which has shown some positive results more recently in Burkina Faso (Broutin *et al.*, 2002, in this publication). Conventional motorized oil expellers are not recommended for shea butter extraction, as the high latex content of the shea kernel are problematic to the operation of the expeller screw.

Over the past two decades, the capacity of current manual press designs has greatly increased (as compared to the over-engineered original models), and prices have come down considerably. In Eastern, current press designs are well-suited to extraction of a shea butter naturally higher in the olein fraction, and adoption of simple, versatile had-presses has been extensive since 1996. A similar design is used in Central Africa, Chad and Central African Republic in particular.

After a decade of technology development, diffusion and extension by COVOL in Uganda, diffusion of the press in Sudan has been very rapid by comparison, and highly successful. Through a regional focus on shea development, the Shea Project has effectively catalyzed the establishment of rural processing enterprises across northern Uganda and Southern Sudan; interest is building in Ethiopia as well.

However, technical obstacles to the development of improved shea processing technologies remain daunting in West Africa, due to the higher stearin to olein ratio of the West African subspecies *paradoxa*, and to social factors of production. Workshop discussions and remarks by participants from West Africa indicate that – despite great investment to date - an improved technology package for West Africa has yet to be developed.

Post-extraction processing

Following extraction, shea butter may be clarified by ‘wet’ boiling with water, at a 2:1 ratio of oil to water, for about 20 minutes. As the foam clears, the mixture is taken off the fire and allowed to cool and settle, and the oil is decanted into a second vessel for a second, ‘dry’ boil of another 10-20 minutes, in order to remove any residual moisture from the oil. When the bubbles stop and the oil goes quiet, the clarification is complete.

The clarification process may be enhanced with the introduction of improved stove designs which increase efficiency, conserve fuelwood, protect the oil from smoke contamination, and are much safer than the traditional 3-stone fire. In Uganda, propane gas stoves are currently used by NUSPA for safety and for product quality.

Following clarification, the shea butter may be cooled whole, or it may be fractionated by physical or chemical methods into a solid (stearin) fraction, and a liquid (olein) or semi-liquid (oleate) fraction.

Product quality control

In addition to the many factors mentioned above – particularly collection, drying and storage of sheanut – storage of the clarified oil is another critical factor in the conservation of a high-quality product.

In storage, it is most critical to ensure that only a perfectly clean and dry container is used, sealed from air and kept in a cool, dry and dark place to prolong its conservation. Even the smallest amount of water in the oil can bring about a very rapid rancidification of the product through oxidation.

Thousands of artisanal or ‘village-level’ producers across the shea zone – using both traditional and improved processing methods – are producing high-quality shea butter. Traditional extraction methods are valuable technical knowledge, a livelihood resource of the poorest of the poor - including grandmothers who must often care for entire generations of grandchildren, in towns and villages across the shea zone. The interests of traditional processors must be considered alongside those of the lucky few who have managed to obtain improved processing technology.

However, as many rural processors are not aware of the critical technical issues which affect product quality, extension training remains a long-term requirement across the shea zone. Project interventions must address the medium- and long-term interests of producers and producer communities in order to succeed beyond the very limited time-frame of a given intervention.

Projects have failed in the past through a hesitancy or fear of adequate engagement with producer groups, on the (theoretical) grounds that full engagement may ‘build dependency’ on the part of the recipient toward the support organization. Sustainability of a given intervention over time is indeed paramount, but the best way to build this in rural areas is often through long-term working partnerships and the active involvement of local community-based structures.

In practice, the sustainable management of a given technology, or extension training in a set of production standards, must be sustained, and critical points re-iterated, over a substantial period of time. Only through full and sustained engagement between support organizations and local producers can rural processing enterprises fully assimilate new techniques for sustainable and consistent control of product quality, and sustain the advantages of improved technologies over the long term.

MARKET DEVELOPMENT OF SHEA PRODUCTS

Market studies

Market studies of shea products have been conducted at all levels – local, national, regional and international – for individual countries and for the world market as a whole.

The earliest comprehensive market figures for the West Africa region were assembled by Ruyssen (1957), later greatly expanded and brought up to date by Marie-Noelle Terpend (1982). More recently, a study of the European market by Dr. Armelle de Saint Sauveur

(1993) was followed by the comprehensive UNIFEM study *Local to Global: the International Market for Shea Butter* (Bekure *et al.*, 1997).

At the national level, a series of detailed market studies on the dynamics of the shea sector (filière karité) have been undertaken in Burkina Faso by CECI (Ouedraogo, 1999) and UNIFEM (Attanasso, 2002), by GRET (GRET, 2001); in Benin by UNIFEM (Sotomey, 2001) and by CECI (Ouedraogo, 1999).

Production and marketing dynamics at the national and sub-national levels in Mali (with reference to European export) have recently been very well documented by Irene Obi (1999 and 2000).

Market surveys

In Uganda, COVOL has documented activity at 16 rural and urban markets throughout northern Uganda since 1995 (Masters and Puga, 2000 and Masters 2002, in this publication). Armelle de Saint Sauveur of Propage has conducted a comprehensive market study of improved shea processing and marketing by the Northern Uganda Shea Processors Association (NUSPA) through the Shea Project (Propage, 1999).

Under the INCO Parklands Project, the University of Freiburg has conducted market studies in Burkina Faso, Mali and Nigeria. A collaborative study between COVOL and the University of Freiburg later this year will draw this data together with COVOL's extensive market survey data from Uganda for comparison.

Market surveys based on the COVOL Uganda format have begun in Sudan, but are very difficult due to pressure from local stakeholders to preserve the import and 'distribution' of relief oil on local markets.

Producer organization and production management

As mentioned above in the discussion of product quality control, production management is a very crucial determinant of consistent product supply and quality over time.

Effective models for rural processing of shea butter must be developed according to local conditions, which may differ from sub-region to sub-region, country to country, and even between localities. However, there does seem to be a progressive trend across the shea zone in favor of small, community-based rural production groups, composed primarily (but not always exclusively) of women farmers.

In West Africa, women's producer groups often come together under an umbrella association or union (*union des groupements*) in order to combine their production and marketing efforts. A similar basic model has arisen concurrently in eastern Africa under the Shea Project, with the establishment in 1997 of the Northern Uganda Shea Processors Association (NUSPA), followed in 2000 by the New Sudan Lulu Network (NSLN). Development and reinforcement of collective marketing associations or unions of producer groups may be a current priority in parts of Central Africa.

In West Africa, the shea sector is much more sophisticated and developed at the national level than is the case in Central and eastern Africa. In Burkina Faso, for example, government programs and countless non-governmental projects and private enterprises are widely dispersed throughout the country, while national fora include the *Projet National Karité*, the *Table Filière Karité*, the *Projet d'Appui aux Filières bio-alimentaires* (PAF), and the CECI *Projet d'Appui à la Commercialisation Karité* (PACK). In West Africa, the shea tree has a high profile; it is well and widely known and appreciated as a resource for development at the national level.

In each of the six countries of central and Eastern Africa, however, development of the shea resource is comparatively recent, and shea products remain a nutritional and economic resource known primarily to the rural poor, in areas far removed from (and otherwise peripheral to) their respective national capitals. Shea development within the sub-region has thus far been driven by community-based organizations - women's groups in particular - and fully appreciated only at the local or provincial level.

Once established, community-based rural producer groups and unions or associations can provide an accessible and representative structure, through which support organizations can efficiently and effectively provide extension training and introduction of improved technical and management techniques.

Management skills and basic literacy are a common need for producers and producer groups across the shea zone. An inventory of existing extension materials and training curricula would be a good starting point upon which to develop future training and extension programs for the further professionalisation of the producers.

While the state has, on occasion, taken an active role in the shea sector (since independence, most notably in Burkina Faso, Mali and Ghana), the trend is currently toward increased privatization and decentralization under a more 'open' trade environment. However, a positive policy environment is an urgent priority across the shea zone, including reduction of trade barriers, exemption from taxes on the part of producer countries, and tariffs on the part of importing countries.

Product development

In order to maximize the value of the shea resource to the primary producer communities who live with the tree, producers must gain access to high-value niche market opportunities. A niche market strategy calls for development of the widest diversity of finished products – from food oils to cosmetics - based on adding value to the highest quality shea butter, as close as possible to the source.

In addition to simple (and more sophisticated) marketing of shea butter as food oil, extensive cosmetic product lines based on shea butter have been developed in numerous countries across the shea zone. Product lines have been developed in Burkina Faso (*e.g.* Phycos and others), Senegal (*e.g.* Phytopharma, Mason du Karité), Central African Republic (Donaval), Uganda (COVOL and NUSPA through the Shea Project) and Sudan (Moon Yoow and Wulu Lulu Works).

While development of sophisticated formulated products may require access to specialized equipment and expertise, simple products of equally high quality may be developed even in rural areas, given a solid training background in production quality standards and access to basic inputs for product formulation, packaging and labeling.

Product marketing

While there is scope for marketing of shea products at least as wide as their production, in order to maximize returns to primary producers, it is essential to develop their basic skills in production and management (including basic literacy and numeracy), as recommended above.

Across the shea zone, the primary task in market development is to resolve the contradiction between the high costs of productivity (including labor) as compared to low farm-gate prices. Currently there are many non-productive speculators and other intermediaries in the shea sector who do not contribute to an added product value - particularly in West Africa, where market prices for shea products are fundamentally linked to prices offered by exporters of the raw material.

As shea production and marketing in eastern and Central Africa is a relatively new industry, producers can contribute more fully to 'making the rules' and setting out standards of conduct based on common principles of equity and ownership by rural women in particular. There may be more scope for building opportunities in a nascent industry, but new opportunities can be built under more established market regimes as well.

Though the supply of shea products is said to far exceed demand (particularly in West Africa, where their export is most extensive), recent developments have demonstrated that new markets can be developed for end-use applications of the highest-quality oil, given consistency of supply and product quality.

Once supply and quality issues are addressed, existing markets can be identified and new markets created - for more direct access by the primary producers, with the facilitation of support organizations over a fixed and limited period. The importance of local markets opportunities for shea products should not be underestimated.

Across the shea zone, recent developments have brought increased access to communication technologies further from urban centers - including mobile telephones and the Internet. Decentralized access to communication brings us closer to a day when producer groups and marketing associations will be able to make direct market linkages, filling orders for higher-value products which consistently meet a set of common quality standards.

An important step toward this objective is increased access to and exchange of technical and market information, between producers and other stakeholders of the shea sector.

Networking for Development of the Shea Resource

This workshop represents the fruition of a long and difficult process of bringing together producers and other stakeholders from across the shea zone.

The first attempts at building a shea network across Africa were the ACDI/FAO meeting on shea, held at FAO, Rome in April 1998, followed in June the same year by the Événement Karité (Shea Event) held at Ouagadougou by UNIFEM and CECI. The Événement Karité brought together participants from across the West Africa region, and from Uganda.

In June of 2000, through the Shea Project, COVOL brought together over 200 participants from Uganda, Sudan and Ethiopia, Burkina Faso, Mali, Ghana and Nigeria, for the First Regional Conference on the Shea Butter Tree *Vitellaria paradoxa* subspecies *nilotica*. Paramount among the final recommendations of workshop participants was formation of an active and accessible shea network to link producers, applied researchers and other stakeholders across the shea zone. Shea producers from 10 projects across southern Sudan have since come together to form the New Sudan *Lulu* [Shea] Network (NSLN).

Through the FAO/CFC International Workshop on Processing and Marketing of Shea Products in Africa, representatives from each of the 16 shea producing countries have come together for the first time in history, to address critical common issues of processing, marketing, and improvement of the shea resource.

At various points in the discussion, workshop participants repeated the call for sustained contact and concerted regional development through a formal network to link producers and other stakeholders from across the shea zone, and across the Anglo-francophone divide.

CONCLUSIONS

Research and development of the shea tree over the past half-century has brought us to a new plateau of opportunity; though important questions remain, we now understand, in broad strokes, the critical parameters of productivity and domestication of the shea resource.

Although some progress has been made in the development of village-level processing technologies, particularly in Eastern Africa (with import for Central Africa as well), access to appropriate improved processing technologies remains a primary need for producers across the shea zone, particularly in West Africa. Other aspects in need of further attention include issues of domestication and resource development as well as issues of management for product quality control, and marketing.

The abundance of recent diagnostic information, and the technical experience of certain lead institutions, offers a valuable opportunity to design specific interventions of moderate scope but significant impact in key countries, in order to bring all the producer countries to a common level in terms of resource development.

The challenge before us is to maintain the synergistic momentum of the Dakar workshop, and sustain communication and exchange of practical information, in order to build institutional linkages and long-term working partnerships across the region.

Based on our current awareness, we are ready now to work together constructively on common and collective solutions to critical common issues of shea processing and marketing, for the ultimate benefit of all producers.

Only by ensuring that the economic benefits, and a meaningful proportion of profits, stay with the primary producers - those who live with the tree – can we hope to achieve sustainable management of the shea resource.

Only by raising the value of the living shea tree for rural households and communities across Africa will this important nutritional and economic resource be conserved for the benefit of future generations.

2. Summary of the Presentations and Discussions

2.1 Report of the First Plenary Session:

The Shea Resource: Characteristics, Management and Conservation Issues

President: Pape Koné, FAO Africa Regional Office, Ghana
Rapporteurs: César Kapseu, University of Ngaoundéré, Cameroun
Abdoulaye D. Tandia, ENDA-GRAF, Senegal
Oumou Kouloum Ly, IUCN, Senegal

This session began at 11:50 and was adjourned at 14:30. Four communications were presented. The duration of each communication was 20 minutes:

The Shea Tree (*Vitellaria paradoxa*) and the African Shea Parklands
Dr. Edouard Bonkongou

Conservation of the Shea Parklands through Local Resource Management
Dr. Joseph Obua,
Makerere University (Uganda)

Women and the Shea Resource: Issues of Ownership and Producer Equity
Dr. Marie Diallo,
UNIFEM Consultant

Improving the Shea Resource: Aspects of Applied Research
Ismaïla Diallo, ISRA/CNRF

Plenary Session 1 Discussions

The principal points addressed during the discussions were the following:

- Improvement of knowledge on the resource – need for an inventory on the whole species, as well as attention to the variability between the sub-species.
- Genetic diversity – need for a study on the genetic or environmental influences on chemical properties of sheanut and shea butter (between the two sub-species).
- Degradation of the resource – need for a policy of protection of the shea parkland against bush fires, parasites and other, anthropic factors
- Land ownership and shea tree tenure: issues of management - Who owns the parkland? Who determines the rules of management? This is a question of managing the shea parkland wisely, so as to insure sustainable and equitable benefits over time.
- Need for establishment of a research institute on the shea tree.
- Need for establishment of a network of expertise and experience concerning technical and market issues on the shea tree.

Areas of applied research:

- Identification and study of the characteristics, qualities and potentials of the two (currently recognized) subspecies *paradoxa* and *nilotica*.
- Quantification of the impact of the parasites on the shea tree and its yield (productivity).
- Genetic improvement and domestication: Selection of superior germplasm according to specific attributes.
- Techniques of vegetative multiplication.
- Methodological approaches to multi-disciplinary problems (technical and social).
- Development of local management systems of the shea parklands (domestication).

2.2 Report of the Second Plenary Session

Utilization, Processing and Product Quality

Chair: Eliot Masters, FAO Consultant
Rapporteurs: César Kapseu, University of Ngaoundéré, Cameroun
Abdoulaye D. Tandia, ENDA-GRAF, Senegal
Oumou Koulsoum Ly, UICN, Senegal

Benefits of Shea Products to Rural Households, Communities and Producing Nations
Félicité Yameogo and Ladi Ziba,
CECI, Burkina Faso

Overview of Post-harvest Handling, Processing and Storage of Sheanut in African Countries
Dr. César Kapseu,
University of Ngaoundéré, Cameroun

Industrial-Level Uses and Quality Control for International Commerce of Shea Products
Lars Laursen,
Aarhus Oliefabrik, Cote d'Ivoire

Plenary Session 2 Discussions

The discussions were primarily focused on three aspects:

i. Product quality

- Currently there are no fixed and established internationally-recognized quality standards; each buyer defines their own criteria of product quality. Sheanut is not included in the Codex Alimentarius, which sets product quality standards for international trade in food products.
- Quality standards should be defined.
- Moisture levels largely determine the quality of sheanut and shea butter.

- There is a wide diversity of product and market applications based on product quality: Food oil, Cocoa Butter Improver (CBI), cosmetic and pharmaceutical applications, etc.
- The influence of primary processing methods on final product quality (composting fruits at harvest, fire-drying or smoking of shea seeds, parboiling of shea seeds, storage methods).

ii. Technical aspects

- Problem of locally-appropriate improved processing technology (particularly in West Africa).
- Variety of the processing methods by area, country and sub-region.
- Different properties of shea butters from the two subspecies (*paradoxa* and *nilotica*).
- Lack of data on the comparative advantages between shea butter and other oils (according to end-use application).

iii. Marketing aspects

- Market trends over time, prices in correlation to quality and supply.
- Differential of price between the producer countries.
- Price competition between shea butter and cocoa butter.
- Importance of financial returns to primary producers (women farmers).
- The contribution of applied research toward development the shea resource.

2.3 Report of the Third Plenary Session

Trade, Markets and Shea Product Marketing

Chair: Paul Vantomme, FAO, Rome

Rapporteurs: Jean Baptiste Zoma, PAF, Burkina Faso

Bernard Ndonazi, Association Donaval, Central African Republic

Market Trends and Perspectives for Shea Products: Local, National, Regional and International
Félicité Traoré and Sylvain Matte, CECI

Building New Markets for Shea Products: Perspectives from Eastern Africa
Eliot Masters, FAO Consultant

International Standards for Raw and Processed Products, Quality Control and Certification Systems for Exported Products
Enrico Casadei, FAO, Rome

Plenary Session 3 Discussions

1) Which are the priority markets for shea products?

It was suggested to focus initially on the local and national markets, then sub-regional and regional market levels. The importance was noted of not targeting solely the international market, access to which is difficult or impossible for most producers.

2) Positioning of shea butter compared to other oils (aspects of substitution).

It is necessary to monitor local markets closely to assess the competitiveness of shea butter as compared to other oils. Access to market information allows producers to develop effective marketing strategies, beyond meeting household nutritional requirements.

3) Which are the most favorable international market applications for shea butter?

It was shown that the cosmetics market constitutes a potentially high-value outlet for the shea butter, although a study showed that required volume is currently quite limited (an estimated potential of only approximately 1 500 tons per year).

4) How does one explain the differences in price of shea products between producer countries?

Differences in price are explained by:

- the level of structuring of the shea sector: the better producers are organized, the more remunerative will be the shea butter they produce;
- the level of quality of butter;
- the ‘democratization’ of access to technical and market information, which allows producers to obtain higher prices by effectively meeting market opportunities.

5) There is need for creation of a network on regional development of the shea resource.

An accessible network for exchange of information between producers and other stakeholders of the shea sector will make it possible for network members to:

- benefit in synergy from collective expertise and experience;
- coordinate the development of the shea resource between producer countries;
- share technical and commercial information;
- develop collaborative strategies for conservation, management and sustainable development of the shea resource.

One strategy would be for a shea network to be ‘grafted’ onto existing networks like that of gum arabic.

6) Why are shea products not standardized and included in the *Codex Alimentarius*?

Up to now, no such request for inclusion has been made by the shea producing *Codex* states. It is up to the Member States to do it. One of the best strategies would be to propose the elaboration of a standard at the next session of the FAO/WHO (Codex) Regional Coordinating Committee for Africa, which will be held in November 2002.

It was recognized that there are no international standards on the shea products [*or at least for shea butter; FOSFA standards for sheanut are used as a standard in West Africa. – Ed.*]. Each buyer specifies their specific requirements. In preparation of the

Codex standard elaboration, there should be some harmonization of product quality standards, probably by the means of the network to be constituted.

2.4 Report of the Fourth Plenary Session

Roles Played by the Different Stakeholders in the Shea Sector

Chair: Enrico Casadei, FAO, Rome
Rapporteur: Bernard Ndonazi, Association Donaval, Central African Republic

- Farmers: Anna Awio, NUSPA/The Shea Project (COVOL Uganda)
- Private sector: Lars Laursen, Aarhus
- NGOs: Félicité Traoré, CECI, Burkina Faso
- Local governments: Diallo Mah Koné, OHVN, Mali
- Research institutions: Jules Bayala, INERA/DPF, Burkina Faso

Plenary Session 4 Discussions

1) Development of the shea resource by country

- It was noted that the level of organization, operation and development of shea sector differs from one country to another, and by sub-region. Some producer countries have only recently begun to pay attention to the shea resource, while others are already well-organized in terms of production and marketing of shea products, with strong national frameworks for dialogue on shea issues.
- It was noted that technical advances already made in certain countries have not been taken up to the advantage of producers in other countries.
- There is an absence of producer access to information on existing markets (national, regional and international). The need for producer access to market information is a primary justification for establishment of a shea network.

2) Stakeholder interests and responsibilities by sub-sector

- There is need to enhance and reinforce the professional capacity of primary producers and producer groups within the shea sector, with an appropriate and well-defined productive role for each actor. It is necessary that each institution contribute according to its strengths and abilities.
- Producers should be equipped with improved production methods for increased and consistent product quality of raw butter, while the other actors will contribute to the development of more refined added-value products.
- The private sector plays a significant role in shea production, but encounters problems including the basic insufficiency of shea butter production, in terms of both quantity and quality.
- It was recognized that NGOs and other support organizations should play a role of supportive partnership, providing technical support for producer groups and marketing associations and facilitating the emergence of dynamic private operators. They should not involve themselves in the actual production, but can contribute

nevertheless to play the role of intermediation between stakeholders, and to disseminate all strategic information to and between the producer networks.

- Local governments have an important role to play in their support of community-based institutions, and a responsibility to maintain an enabling policy environment.
- Applied research on the shea tree has already yielded some significant results. However, these results are incomplete, and have not yet been effectively disseminated throughout the region. All relevant research results should be made accessible to the producers.

Plenary Session 4 Resolutions

1. Development of market opportunities for shea products, starting with analysis of market conditions (local, national, sub-regional and international).
2. Clarification of the roles of various stakeholders of the shea sector, and demand-driven, responsive technical support to build the professional capacity of producer groups and marketing associations.
3. Inventory of all technical and commercial information from across the region, followed by collaborative and concerted action in order to make such information useful to producers for the benefit of the shea sector as a whole.
4. Development of regional guidelines for conservation and sustainable use of the shea tree, and its regeneration.
5. Continue the search for improved processing methods through technical, social and economic assessment of available techniques and technologies
6. Implementation of extension training programs to reinforce the professional capacities of producer groups and marketing associations.
7. Establish a regional network on the shea tree.

3. Working Group Conclusions

3.1 Working Group 1: Improvement of the Shea Resource (Applied Research and Technical Aspects)

Identification of Constraints and Opportunities

A. Constraints

1. Useful information is sparse, scattered and often inaccessible.
2. Absence of networks to facilitate sharing and exchange of information on research activities and results.
3. Difficult to find financing for research activities.
4. Challenges to sustainable management of the shea resource:
Trends of aging and unproductive shea tree populations, hampered natural regeneration.
5. Long juvenile period before the first fruiting.
6. Lack of awareness regarding the practical potential of the living shea tree, including risk factors.
7. Absence of a lead (or focal) institution in each country on aspects of shea research and development.

8. Failure to realize the potential value of the living shea tree at the national institutional levels.
9. Absence of standard methodologies for resource assessment.
10. Resource access and tenure, local management systems not well understood.
11. Lack of operational use (through extension) of existing knowledge.
12. Lack of appropriate village-level processing technologies.
13. Little respect at the local level of traditional and/or legislative measures to protect and preserve the shea tree.

B. Opportunities/Potentials

1. Strong potential for import substitution in favor of locally-produced shea butter and added-value shea products.
2. Development of the shea resource will prevent degradation of soils, will increase rural food production, and will help to diversify rural livelihoods and boost national economies.
3. Sustainable, non-destructive utilization of shea woodland and increased benefits from the living shea tree will reinforce conservation and regeneration of the species, and its associated woodland biodiversity.
4. Shea has a very strong cultural significance, and value as a wide range of useful product applications (nutritious fruit, food oil, skin treatment, medicine, etc.).

C. Conservation and Improvement of the Shea Resource

1. *Research*

- 1.1 Development of national and regional action plans
- 1.2 Establish a regional network on the shea tree
- 1.3 Install a national frameworks for dialogue and exchange

2. *Domestication*

- 2.1 Selection of locally-favored attributes, identification of ‘plus trees’
- 2.2 Biological aspects of production
- 2.3 Techniques of vegetative multiplication
- 2.4 Applied research on tree management

3. *Conservation and management of the natural stands*

- 3.1 Resource assessment at the national and sub-regional levels
- 3.2 Development of agroforestry-related technologies
- 3.3 Establishment of permanent sample plots for ecological monitoring
- 3.4 Establishment of germplasm conservation plantations
- 3.5 Establishment of *in situ* conservation activities, in partnership with local farmers
- 3.6 Conservation of living shea seeds
- 3.7 Characterization of populations across the range
- 3.8 Evaluation of (intra-specific) genetic diversity
- 3.9 Development of plans for domestication and resource improvement

4. *Development*

- 4.1 Recognition of the potential value of the shea tree in afforestation programs.
- 4.2 Valorization (optimal development of potentials) and operationalization of the assets of research, by both the public and private sectors

5. *Institutional/political aspects*

- 5.1 Political will to promote the shea tree at the national and regional levels
- 5.2 Sensitization of political decision makers and local communities
- 5.3 Promotion of an enabling policy environment
- 5.4 Organization and reinforced responsibility, by rural communities and local government, for sustainable resource management
- 5.5 Development of national legal and legislative frameworks for the protection and conservation of the shea tree

D. **Priority Actions**

- 1. Establishment of a (regional) Shea Network for exchange of practical information and existing knowledge.
- 2. Development of a regional program for applied research and development of the shea resource.
- 3. Periodic and regular meetings of the shea researchers.
- 4. Development of national programs for applied research and development.
- 5. Financing by FAO and/or other donors of the national and regional programs.

3.2 **Working Group 2: Harvesting and transport, processing and quality control**

Key constraints and potentials

- Insufficient attention to proper storage methods, necessary in order to avoid the deterioration of the product.
- Problems of resource ownership and producer equity, risk in remote areas, social or religious constraints, uncertain access to the resource.
- Collection of fruits without any grading and separation of harvested sheanut according to quality.
- Collection of all fallen fruit including germinating seeds, which may limit the regeneration of the species.
- Lack of access to transport, and lack of infrastructure.
- Harvesting during the rainy season; competition of labor between the shea harvest and cultivation of different crops.
- Difficult conditions of working during the early hours, with significant risks (e.g. snakebite).
- Exploitation of children, and need to focus on aspects related to the context of local society.

- Smoking of sheanuts develops a dark oil, which might be appreciated by local consumer but is not accepted at the export level (the other method used to stop the enzymatic activity and preserve the fats is parboiling).
- Mixing of sheanuts of different quality has a negative effect on the quality of the end product.
- Problems of packaging, both of the nuts as raw material and of the end products.
- At import level, the first problem is dust originating from sand and wind, the second is the water content, and contamination by foreign material.
- Lack of appropriate technologies for processing and extraction of shea butter in West Africa.
- Organization of women's groups and associations is a common strategy in response to problems of harvest, transport and storage of shea nut.
- The process of smoking of nuts prior to or during storage should be discouraged (or eradicated), in order to avoid the alteration of the product from physio-chemical or toxicological aspects.
- Adoption of 'best practices' and development of appropriate guidelines for training to avoid the mixture of products of different different.
- Test products at production level, in order to reinforce product quality control and standardization according to market requirements.
- Adoption of appropriate methods and equipment for grinding and extraction in order to facilitate the work of processing from raw product to semi-processed and finished products.
- Development of regional standards for shea nut, butter and oil at regional level with the collaboration of institutions of producing countries under the framework of the Codex Coordinating Committee for Africa.

Priority areas of intervention for future activities

1. Training of rural women in good practices of harvesting, storage, transport and processing of shea nut.
2. Research and development of appropriate processing equipment.
3. Research and development on optimized methods of storage and preservation of shea products.
4. Establish an appropriate network among producing countries in the region, with the assistance of international organizations, in order to facilitate the exchange of technical information, develop research and training activities, and to allow producers to obtain information on prices and market trends.

3.3 Working Group 3: Marketing and Commercialisation

A. Constraints and Potentials

1. Weak characterization of supply; lack of information of the volume of supply by location, and the patterns of its variation over time; this information would be useful for the definition of policies at the national and sub-regional levels, and to support the commercial activities of buyers as well as suppliers.

2. Little differentiation or classification of supply between products of different quality and value, which would ideally serve a diversity of market needs at a range of price levels; need for standard definitions of various categories of quality and price, according to visible (and less visible) indicators of quality.
3. Weak capacity on the part of producers for control of quality and production standards affecting quality. Production standards must be established and maintained to allow for optimal market development, addressing critical issues of processing techniques and technologies, storage methods, exchange of information, and infrastructural aspects.
4. Weak knowledge of, and limited information flow regarding, existing markets (characteristics, requirements, potentials, prices); of the potentials which exist at the local level (aspects of quality and packaging), regional and international levels (beauty / skin care, fair trade, equitable and bio/organic niches).
5. Absence of effective regulations at the national and sub-regional levels, as well as the international (e.g. absence of shea products from the Codex Alimentarius); need for defense of the interests of the producers (international regulations specify a minimum rate of only 0.03 percent to use term "shea butter" as an ingredient); need for the producer countries themselves to address these questions.
6. Existing markets little developed given their potential; this is related to a lack of promotion among producer countries at the national level, coupled with a general lack of information on the markets, resulting in reduced capacity to respond effectively to market exigencies.
7. Low prices predominate; difficulties of competitiveness in comparison with other products processed (or available) locally; role of national policies and government policy in enabling a capable and flexible response in adaptation to market opportunities (particularly to serve national and export niches).
8. Challenges for the women to maintain their traditional ownership and stewardship of the shea resource; need to acquire new skills, explore new models for the organization of production ('professionnalisation') in order to reinforce producer equity; evolution towards entrepreneurial competence, by building producer capacity to capitalize on market opportunities and exploit new, higher-value market niches.
9. Problems of a fungible international market (substitution of shea butter by other food oils).
10. Need for state agencies to obtain the necessary statistical tools to inventory market potentialities, and to monitor their evolution over time; need to establish a Market Information System (MIS), including data on the volume of supply at the level of primary production.

B. Strategies

1. To set up systems for standardization in labeling (buyers, traders, producers), based market requirements (if possible according to a classification system based on commonly-held standards).
2. To establish market information systems, including data on prices and volumes on various markets, and facilitation of communication between interested actors to share useful market information.
3. Stakeholders must lobby their respective national governments states to prepare a formal request to include shea butter on the *Codex Alimentarius*.
4. Analyze (and respond) to demand, in particular of potential market opportunities at the local, national and sub-regional levels; develop new products, develop promotion of shea products and their consumption.
5. Support the establishment of appropriate rural processing enterprises in each of the producer countries.
6. Identify the comparative advantages of a broad diversity of shea products (rational choice of potential markets).
7. Reinforce the professional and entrepreneurial capacities of the women producers, and of their producer groups and marketing associations.
8. Facilitate producer access to professional advice, training and technical support.
9. Establish a shea network, with sub-networks at the national level (allowing for dialogue between national sector stakeholders), and the sub-regional level, to reflect African priorities.
10. Analyze and monitor existing markets, and make technical and commercial information available.
11. Establish production norms, and techniques to assure effective and consistent control of product quality on all levels of production, processing and trade.
12. Promote local and national consumption of shea products first.
13. Establish concerted and collective action in order to address critical issues of production and marketing at the national and sub-regional levels, and Africa-wide.

3.4 Working Group No. 4: Social Prospects: Access to Resources, Equity of Incomes and Benefits at all Levels

Mme Marie Diallo, Phytopharma (Senegal)

Mme Koné Traoré, OHVN (Mali)

(The working group consisted of 16 people, from seven different countries.)

A. Introduction

Our task is to reinforce the economic capacities of the women by equipping them with the necessary competences required to enable them to enter the regional and world markets.

The Shea tree is a basic (and essential) resource for women because of its potential to provide sustainable rural livelihoods. Across the African shea zone, women are the traditional custodians of the shea resource, with responsibility and control over all the stages of processing – from collection of the fruit to transformation and marketing of shea butter. Though women are not allowed to own land in many cultures across the shea zone, they do have access to the shea resource.

This strong presence of the women in the shea sector does not, however, guarantee their ownership and control of the shea resource. Quite to the contrary, current market prospects make them more vulnerable than ever before, risking loss of one of the few remunerative opportunities for sustainable incomes and livelihoods.

Indeed, the development of the shea resource has to date been largely responsive to the interests of large industries and transnational corporations with financial and technical capacities to dominate the market.

B. Constraints

1. Lack of a cohesive shea sector (*filière karité*), due to
 - 1.a Disorganized production (predominantly by individuals and small community-based groups).
 - 1.b A multitude of unproductive intermediaries which do not add value to the product, but rather exploit the considerable gap between farm-gate and export price levels.
 - 1.c Fierce competition between producers and other stakeholders.
2. Lack of professional skills on the part of the rural women producers.
3. Lack of access to appropriate village-level processing technologies for reduction of labor and other inputs, and for increased productivity.
4. Lack of logistical inputs and production capacity (tools, small items of protection such as gloves and boots, access to transport, facilities for nut drying and storage).
5. Low levels of institutional capability on the part of local and national government, community-based organizations, producer associations, NGOs, etc.

6. Low rates of literacy among producers, hampering strategic planning of production and marketing; this reduces the capacity of the producers to engage in effective negotiations, and to respond effectively to market opportunities.
7. Difficulty of obtaining required inputs for conventional shea processing – *e.g.* water, scarce fuelwood, etc., which must be transported from afar.
8. Negative environmental impacts of traditional processing methods, such as the cutting of productive trees as fuel.
9. Management factors which reduce productivity and regeneration of the shea resource, *e.g.* failure to manage brush-fires through controlled ('quiet') burning.
10. Lack of capital for investment by rural producers

C. Opportunities

1. The shea tree provides a high-value and unique natural product, increasingly significant to agro-alimentary industries, with growing high-value opportunities, particularly in the pharmaceutical and dermo-cosmetic industries.
2. New EU regulations regarding the use of shea butter as a Cocoa Butter Equivalent / Improver (CBE/CBI) may offer further opportunities for shea producers.
3. Exchanges of competence and experience in shea development between producers, other stakeholders and stakeholder institutions of the producer countries.

D. Strategies for the Development of the Shea Sector

1. Reinforcement of the position of the women as primary stakeholders at all levels of the shea sector by facilitating their access to the acquisition of professional skills.
2. Organization of the shea sector through training of producers and processors in production management, and the institutional development of rural producer groups.
3. Reinforcement of the organizational, technical, management and commercial capacities of producers.
4. Promotion of national frameworks of coordination of the shea sector, to include all stakeholders.
5. Organization of national sub-networks or 'think tanks ' on the shea sector, with the participation of the producers, support institutions, government and other stakeholders, in order to reach national consensus on the opportunities and critical needs of the sector, and *to propose policy guidelines and recommendations for appropriate resource management interventions.*
6. Support to the rural women producers (and youth), including access to small-scale credit facilities for investment in sustainable income-generating activities.

E. Priority Areas for Intervention

1. Reinforcement of the organizational abilities of the women producers (in producer groups and marketing associations).
2. Development of female leadership at the rural level.
3. Develop an extension training program on proper techniques of collection, storage and processing, in order to obtain a final product of consistently high quality.

4. Develop an entrepreneurial training program in techniques of management, basic accounting and marketing to facilitate women's access to - and control of - remunerative market opportunities for their products.
5. Establishment and reinforcement of artisanal production units for shea processing and development of new, added value finished products.
6. Identification of structures of support and creation of platforms for dialogue, collective exchange and concerted action.
7. Creation of standard purchasing guidelines (based on product grading) to establish and reinforce quality standards, to guarantee corresponding (and proportionate) price margins to producers.
8. Establishment of programs of rural resource management to enhance the regeneration of natural populations of the shea tree.
9. Establish a program to sensitize of rural men and women on management for conservation of the shea resource; assumption of responsibility by local governments, with the support of rural communities, for management activities (e.g. protection of the tree from cutting, management of brush-fires).
10. Establishment of systems for provision of small-scale rural credit, made accessible specifically to the producers.
11. Development and diffusion to women producers of appropriate village-level technologies, in order to reduce the arduous female labor requirements (thus freeing more time for care of the family, and for other productive enterprises), and to increase overall productivity.
12. Establishment of networks on the national and regional levels, in order to support exchange and transfer of technical and market information.
13. Organization of study visits and exchanges between producer countries, in order to share experience between producers and producer groups, and within networks.

4. *Workshop Recommendations and Conclusions*

The following constraints, potentials and recommendations were identified by the sub-sectoral working groups, according to the following categories:

4.1 Ethnobotany and Economic Botany of the Shea Tree (*Vitellaria paradoxa*)

Constraints

- Failure to realize the potential value of the living shea tree at the national and institutional levels.
- Lack of awareness regarding the productive parameters of the shea resource, including risk factors.
- Little respect at the local level of traditional and/or legislative measures to protect and preserve the shea tree.

Potentials

- Shea has a very strong cultural, nutritional and economic significance for millions of farmers across sub-Saharan Africa.
- Shea has a very wide range of applications, and has high value in a diversity of end-use products (nutritious fruit, food oil, skin treatment, medicine, etc.).
- Development of the shea resource across Africa will help to prevent degradation of soils, will increase rural food production, and will help to diversify rural livelihoods and boost national economies.

Recommendations

1. Resource assessment at the national and regional levels.
2. Establishment of applied research programs on the shea resource, including establishment of permanent sample plots for ecological monitoring, germplasm conservation plantations, and *in situ* conservation activities in partnership with local farmers.
3. Characterization of the populations across the region; evaluation of intra-species genetic diversity.

4.2 Shea Resource Diversity and Domestication

Constraints

- Challenges to sustainable management of the shea resource, trends of aging and unproductive shea tree populations; insufficient natural regeneration.
- Long juvenile period (of 12-20 years) before the first fruiting.
- Issues of resource access and tenure.
- Local management systems not well understood.
- Absence of standard methodologies for resource assessment.
- Lack of operational use (through extension) of existing knowledge and results of applied research.
- Difficulty in obtaining funding in support of applied research activities.

Potentials

- Sustainable non-destructive utilization of shea woodland and increased benefits from the living shea tree will reinforce conservation and regeneration of the species, and its associated woodland biodiversity.
- Improvement of the shea tree through domestication will increase productivity, and the long-term sustainability of the shea resource.

Recommendations

- Development of national plans for domestication of the shea resource, and its improvement.
- Recognition of the potential value of the shea tree in afforestation programs.
- Operationalization of research results by the public and private sectors.

- Implementation of rural resource management programs of to enhance the regeneration of natural populations of the shea tree.
- Assumption of responsibility by local governments, with the support of rural communities, for sound resource management activities (e.g. protection of the tree from cutting, management of brush-fires).

4.3 Technical Improvement of Shea Processing

Constraints

Technical Constraints

- Lack of appropriate, village-level technologies for rural extraction and processing (particularly in West Africa).
- Lack of producer access to existing appropriate technologies for village-level extraction and post-extraction processing.
- Problems of packaging shea products (both raw and finished products).
- Insufficient producer organization and professional capacity.
- Lack of attention on the part of producers to factors which affect product quality and overall productivity (e.g. aspects of harvesting and transport, processing and quality control in production).

Productivity and Management Issues

Lack of a cohesive shea sector (*filière karité*), due to:

- Disorganized production (predominantly by individuals and small community-based groups).
- A multitude of unproductive intermediaries which do not add value to the product, but rather exploit the considerable gap between farm-gate and export price levels.
- Fierce competition between producers and other stakeholders.
- Lack of professional skills by rural women producers.
- Lack of access to appropriate village-level processing technologies for reduction of labor (and other inputs), and increased productivity.
- Lack of logistical inputs and production capacity (tools, small items of protection such as gloves and boots, access to transport, facilities for nut drying and storage).
- Low levels of institutional capability on the part of local and national government, community-based organizations, producer associations, NGOs, etc.
- Low illiteracy rate among producers, hampering strategic planning of production and marketing. This reduces the capacity of the producers to engage in effective negotiations, and to respond effectively to market opportunities.
- Difficulty of obtaining required inputs for conventional shea processing (e.g. water, scarce fuelwood, etc.) which require transport.
- Negative environmental impacts of traditional processing methods, (e.g. cutting of productive trees, fuelwood inputs).
- Lack of attention to management factors which reduce productivity and regeneration of the shea resource, e.g. failure to manage brush-fires through controlled ('quiet') burning.

- Lack of capital for investment by rural producers.
- Lack of access to transport and general lack of infrastructure.
- Labor bottlenecks due to timing of shea harvest at onset of rains (conflict between processing of sheanut and cultivation).
- Lack of attention to labor issues (women and of children); need to focus on social aspects and respond to local needs.

Potentials

- Increased productivity of sheanut and shea butter, in terms of both quantity and quality.
- Increased returns to the primary producers for a consistently higher-quality product.
- Enhanced household nutrition and livelihood security for producers.
- Stronger rural economies, based on long-term sustainable management of a natural resource.
- Increased significance of the shea resource to national economies throughout the region through import substitution, increased employment, small-scale industrial development and export returns.

Recommendations

I. Technical

1. Develop a regional extension training program on proper techniques of collection, storage and processing to obtain a final product of consistently good quality.
2. Research development for locally-appropriate processing equipment.
3. Development and diffusion to women producers of appropriate village-level technologies to reduce the arduous female labor requirements (thus freeing time for care of the family, and for other productive enterprises), and to increase overall productivity.
4. Applied research and development on methods of optimized product storage and preservation.
5. Establishment of rural processing enterprises for shea processing and development of new, added value finished products.
6. Development of product quality standards for shea products at the regional level, and between collaborating institutions of the shea producing countries, under the framework of the Codex Regional Coordinating Committee for Africa.
7. Monitoring of product quality at the source, through extension training and access to analytical and laboratory facilities.

II. Management

8. Training of rural women in improved techniques of harvesting, storage, transport and processing of shea nut.
9. Reinforcement of the organizational abilities of the women producers (in producer groups and unions groups and marketing associations); development of female leadership at the rural level.

10. Develop an entrepreneurial training program in techniques of production management, basic accounting and marketing in order to facilitate women's access to - and control of - remunerative market opportunities for their products.
11. Establishment of systems of small-scale rural credit, made accessible specifically to the producers.
12. Identification of structures of support, and creation of platforms for dialogue, collective exchange and concerted action.

4.4 Developing Equitable Markets for Shea Products

Constraints

- Weak production and inconsistent product quality; lack of production and quality standards, consistency of pricing, standard and common units of measure.
- Lack of product classification, standardization, certification and labeling.
- Problems of market structure: many commercial intermediaries without added value.
- Weak and often unsupportive policy environment.
- Strong competition from other, cheaper products with higher prestige or promotional profile (including imported relief food oils).
- Lack of consumer awareness of the myriad virtues of shea at all levels (local to international).
- Lack of information regarding volumes of supply by location, patterns and cycles of variation over time.
- Information useful for the definition of policies at the national level and under regional and for the purchasers of sheanut and of butter.
- Insufficient differentiation or classification of supply between products of different quality and value, which would ideally serve a diversity of market needs at a range of price levels.
- Need for standard definitions of various categories of quality and price, according to visible (and less visible) indicators of quality.
- Weak capacity on the part of producers for control of product quality, and mastery of production standards which determine quality. Production standards must be improved and maintained to allow for optimal market development, addressing critical issues of techniques (and technologies) for optimized processing and storage, access to information, and infrastructural support.
- Weak knowledge of, and limited information flow regarding, markets (characteristics, requirements, potentials, prices), lack of awareness of the potentials that exist at the local to international levels (from food products to beauty care, fair trade, equitable, bio/organic niches).
- Absence of effective regulations at the national and sub-regional levels, as well as the international (*Codex Alimentarius*).
- Need for a common articulation and defense of the interests of producer countries.
- Existing markets little developed, given their potential.
- Low prices predominate throughout the shea sector, as do issues of competition for products processed locally. Role of national policies and government policies to allow for a capable and flexible response in adaptation to market opportunities (particularly to serve the national and export market niches).

- Challenges for rural women to maintain their traditional ownership and stewardship of the shea resource.
- Need for producers to acquire new skills and greater professional capacity, explore new models for organization of production in order to reinforce producer equity.
- There is need for evolution on the part of producers towards entrepreneurial competence, by acquiring the capacity to capitalize on market opportunities and exploit new, higher-value market niches.
- Problems of a fungible international market (competition between shea butter and other food oils).
- There is need for government institutions to obtain the necessary analytical tools in order to inventory market potentialities, and to monitor their evolution over time.
- There is need to put in place a regional market information system, including data on prices according to volume of supply at the level of primary production.

Potentials

- The shea tree offers a high-value and unique natural product, increasingly significant to agro-alimentary industries, with higher-value opportunities in pharmaceutical and dermo-cosmetic industries.
- New EU regulations regarding the use of shea butter as a Cocoa Butter Equivalent/Improver (CBE/CBI) may offer further opportunities for shea producers.
- Evolution towards entrepreneurial competence on the part of the producers; enhanced producer capacity to capitalize on new (and potential) market opportunities.
- Potential of small, high-value niche markets for the highest quality products; premium prices for 'bio' production, and in recognition of producer equity (fair trade).
- Strong potential for import substitution in favor of locally-produced shea butter and added-value shea products.

Recommendations

1. Reinforcement of the position of the women as principal stakeholders at all levels of the shea sector, by facilitating their acquisition of professional skills.
2. Support to the rural women producers (and youth), including access to small-scale credit facilities for investment in sustainable production enterprises.
3. Establish systems of standardization in labeling (among producers, traders, buyers), based market requirements, and according to a classification system based on common and regionally-harmonized standards.
4. Creation of standard purchasing guidelines (based on product grading) to establish and reinforce quality standards, to guarantee corresponding (and proportionate) price margins to the producers.
5. Establish market information systems, including collection and dissemination of data on prices and volumes on various markets, and facilitation of communication between stakeholders in order to enhance the exchange of useful technical and market information.
6. Producers and other stakeholders must lobby their respective national governments states to prepare a formal request to include formalized shea butter standards in the Codex Alimentarius.

7. Analyze (and respond to) market demand, in particular to potential market opportunities at the local, national and sub-regional levels; develop new products, undertake promotion of these products and their consumption.
8. Support the establishment of appropriate rural processing enterprises in each of the producer countries.
9. Identify the comparative advantages of a broad diversity of shea products to allow producers to develop informed strategies for accessing potential markets.
10. Reinforce the professional and entrepreneurial capacities of the women producers, and of their producer groups and associations.
11. Facilitate producer access to professional advice, training, and technical support.
12. Promote local and national consumption of shea products first.
13. Establish concerted and collective action in order to address critical issues of production and marketing at the national, sub-regional and regional levels.

4.5 Networking for Development of the Shea Resource

Constraints

- Useful information is sparse, scattered and often inaccessible.
- Lack of access to essential technical and market information on the part of producers and other stakeholders in the shea sector.
- Absence of a lead (or focal) institution in each country on shea research and development.
- Absence of any structure to facilitate regional exchange of technical and market information and results of applied research and development.

Potentials

- Exchange of technical and market information, competence and experience between actors and institutions of the various producer countries will increase the productivity of the shea resource.
- Greater organization of the shea sector, including reinforcement of the organizational, technical and commercial capacities of producers, will increase the productivity of the shea resource.
- The emergence of national and regional frameworks, to include all stakeholders, for coordination and concertation of activities of the shea sector will increase the total productivity of the shea resource.

Recommendations

1. Creation of a Shea Network to support exchange of technical and market information, with sub-networks at the national level (allowing for dialogue between national actors) and the sub-regional level, to reflect African priorities.
2. Development of national and regional action plans for sustainable management of shea resource, applied research and development.
3. Financing by FAO and/or other donor agencies of national and regional programs concerned with shea development.
4. Build a national and regional framework for dialogue between shea stakeholders.

5. Develop a regional program for applied research and development of the shea resource.
6. Analyze and monitor existing markets, and make technical and commercial information available to all stakeholders.
7. Establish production norms and techniques in order to assure effective and consistent control of product quality on all levels of production, processing and trade.
8. Organize of study visits and exchanges between producer countries, in order to share experience between producers and producer groups and within networks.
9. Periodic and regular meetings of shea researchers and practitioners.
10. Develop political will to promote the shea tree at the national and regional levels.
11. Sensitization of political decision makers and local communities.
12. Promotion of an enabling policy environment at the national and sub-regional levels.
13. Reinforced responsibility for sustainable resource management by rural communities and local government.
14. Development of national legal and legislative frameworks for the protection and conservation of the shea tree.

4.6 Conclusions

1. The workshop was implemented effectively, and was very successful in achieving each of its objectives.
2. The extended benefits of the workshop are likely to include a more regional approach to shea development across Africa, with attention to sustainability, producer equity, and women's traditional role as custodians of the shea resource.
3. Through a coordinated, regional approach to critical issues of technical development, training and extension, networking and exchange of technical and market information between producers and other stakeholders, total productivity of the shea resource can be increased and sustained over time.
4. Over the short term, adding value through improved processing and enhanced profitability of rural production will increase both the quantity and quality of shea butter produced, increasing women's incomes, and thus reinforcing the nutritional and livelihood security of rural households.
5. Over the long-term, increased productivity and financial returns to the primary producers will provide a sustainable economic incentive to reinforce sound management for the productivity, regeneration and conservation of the shea resource across Africa.

SECTION II

1. PRESENTATIONS

The Shea Tree (*Vitellaria paradoxa*) and the African Shea Parklands

Edouard G. Bonkougou

ABSTRACT

The shea tree *Vitellaria paradoxa*, a fruit tree indigenous to the semi-arid and subhumid savanas of sub-saharan Africa, is valued throughout the region for its numerous and diverse products and services, including: edible sweet fruits, high-protein caterpillars and the renowned edible oil known as shea butter. Traditionally, farmers in the region preserved this valuable resource by integrating shea trees (and other useful trees) and annual crops in a farming system known as parklands. The system has worked well in the past, but it is now breaking down under increased human population pressure. Shea trees are ageing, natural regeneration is impeded by excessive reduction of fallow periods, vigor and fruit production of many adult trees are reduced because of frequent attacks by plant parasites, viz. *Tapinanthus* spp.

There is increasing evidence that the yield and quality of shea butter are not determined by processing techniques alone. Tree traits also are important determinants of butter characteristics. Continued degradation of the resource base therefore will not only affect the volume of supply, but will also affect quality aspects related to disappearing intra-species biodiversity.

This paper highlights the importance of shea trees and shea parklands, reviews some of the many threats to shea resources, and advocates the need for shea development programmes and projects to integrate sustainable management and improvement of the resource base in their priorities.

INTRODUCTION

The shea tree (*Vitellaria paradoxa*), or *karité* in French, is a wild fruit tree indigenous to the semi-arid and sub-humid savannas of sub-Saharan Africa. In addition to providing sweet and nutritious fruits, medicinal products, durable wood and high-protein caterpillars, the tree is most famous for its world-renowned vegetable fat known as shea butter. Trade of shea butter has become a multimillion-dollar business which provides a significant proportion of the foreign exchange revenues to several countries in West Africa. Whereas other cash crops in the region (e.g. cotton, coffee, cocoa, etc.) are benefiting from integrated development efforts with substantial investments to improve the crop genetic resources, activities in the shea industry have concentrated almost exclusively on processing and marketing. Little effort – if any – has been made to improve shea resources. Seven centuries after the trade of shea butter beyond its production area was first recorded (by the Moroccan traveller Ibn Battuta back in the 14th century), the shea tree remains a wild resource.

Traditionally, farmers in the region preserved this valuable resource by nurturing shea trees (and other valuable trees) in agricultural lands in the African Parkland farming system, characterised by scattered trees on fallow and cultivated land.

The system has worked well in the past, but it is now degrading under increasing population pressure and newly-prevalent plant parasites. Although current level of shea nut production in West Africa far exceeds local and international demand, continued degradation of the resource base will ultimately undermine the ability of producing countries to meet future demands. Moreover, there is increasing evidence that the yield and quality of shea butter are not determined by processing techniques alone; tree genetic traits also influence butter quality. As industrial research moves beyond the food sector to explore novel opportunities in the cosmetic and pharmaceutical sectors, loss of biodiversity through continued degradation of shea genetic resources can translate into lost economic opportunities.

Scattered in the gloomy picture, however, there are emerging signs of hope. Over the last 10 years, various initiatives have been launched to characterize shea genetic resources (germplasm collection and provenance trials) and develop horticultural techniques, including seedling and vegetative propagation techniques. Although these efforts remain isolated and too limited in scale to have had a significant impact on shea resources as yet, they illustrate a trend of renewed interest to protect and improve the shea resource. This paper first summarizes information available on shea resources, then reviews some of the many threats to the shea resource base, and advocates the need for the *filière karité* (shea sector) to expand its programmes and projects beyond processing and marketing to stress the critical issues of protection and improvement of the resource base.

THE RESOURCE BASE

Shea Geographic Distribution and Biodiversity

The natural range of shea present distribution has been documented by:

Terpend (1987) and Hall *et al.* (1996) using herbarium and literature information. The range covers about 1 million km² in semi-arid and subhumid savannas in sub-Saharan African. The shea belt is a band 500-750 km wide stretching some 5 000 km across 18 countries from Senegal in the west to Uganda and Ethiopia in the east. The species is absent from the humid forest, from coastal areas and from highlands at altitudes above 1 600 m.

Variability in shea trees is enormous and not yet fully understood. Local people in West Africa have long identified several varieties on the basis of precocity in flowering and fruiting, sweetness of fruit pulp, size and colour of leaves and fruits, etc. Boffa *et al.* (1996) report that farmers in Burkina Faso for example, use “narrow leaves” as a criterion to distinguish a *taam daaga*, or tree that produces small nutless fruits. Also, some trees known as *zoopèla* (literally white color nuts) produce nuts that fall before maturity. Botanists and explorers also reported this great diversity of shea resources (Chevalier, 1943; Aubreville, 1950). The current general view is that the genus *Vitellaria* consists of only one species: *Vitellaria paradoxa*, with two subspecies: 1) *Vitellaria paradoxa* subspecies *paradoxa* and 2) *Vitellaria paradoxa* subspecies *nilotica* (Hall *et al.*, 1996).

Subspecies *paradoxa* occurs in the western range of the shea belt extending over 4700 km and covering 15 countries: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Senegal and Togo. Subspecies *nilotica* occupies the eastern range and is found in four countries: Ethiopia, Sudan, Uganda and the Democratic Republic of Congo. Subspecies *nilotica* grows at higher altitudes (650 – 1600m) and under cooler temperatures (21-22°C mean annual temperature) than subspecies *paradoxa* (100-1300m elevation; 25-29°C). An additional distinguishing characteristic between the two subspecies relates to butter chemical composition, which has major economic significance. The consistency of butter from the western subspecies *paradoxa* is high in stearic acid, yielding a solid butter, while fat from the eastern subspecies *nilotica* is dominated by oleic acid, yielding a liquid oil.

Wiesman and Maranz (2000) suggest that differences in fatty acid profile in *Vitellaria* may be principally due to genetic differences rather than environmental factors, although elevation could be involved in the genetic differentiation of populations. From an analysis of the spatial distribution of fatty acid profiles, the authors indicate that the results present the possibility that there may be a third subspecies of *Vitellaria* in the western end of the species range. This underscores again the great diversity of shea resources and will undoubtedly revive the debate on shea biodiversity.

Shea Population Stocking and Productivity

Quantitative information is currently lacking on shea stocking and productivity across the whole range of the species. This contrasts tragically with the widely recognized economic, environmental and sociocultural importance and potential of the species. Although several local studies have been conducted by research institutes and development projects, no major co-ordinated effort has yet been undertaken to provide quantitative estimates of the whole resource base. Even results from the scattered studies that exist are not comparable. A review of studies conducted on shea resources shows that these studies differ widely on the following key aspects: sample size, sampling methods, definition of what should be counted as a stem, and tree parameters measured (Bonkougou, 1987; Hall *et al.*, 1996).

For example, plot size in the different studies varies from less than 0,25 ha to more than 20 ha. Tree size also has been measured differently: some studies report measurement of root collar diameter, others refer to stem height and still others consider diameter at breast height (Hall *et al.*, 1996). Not surprisingly, estimates of stocking are very variable depending on how individual studies were conducted. The section below summarizes information available on shea population stocking, tree size structure and fruit production.

- *Stocking:*

The broad range of results on shea density has been reviewed by Hall *et al* (1996) and Boffa (1999). Density varies widely from less than 1 – 2 stems per hectare to more than 80 stems per ha. It is not clear, however, how much of these differences reflect genuine differences in stocking and how much relates to sampling methods.

- *Size structure:*
Notwithstanding differences in local situations and sampling techniques, a consistent characteristic of size distribution in shea population is that larger diameter individuals tend to dominate, especially in crop fields, where young regenerants are often few. Size distribution varies considerably depending on land use systems: natural bush, fallowland or cropped field. Larger number of stems with more balanced size classes occur in natural forests and old fallowlands, whereas trees on crop fields tend to be dominated by large diameter classes. Also, trees on cropland are more vigorous than in the natural bush or in old fallows because they benefit from farmers' care and protection from fires.
- *Fruit and nut production:*
Shea trees have a long juvenile phase, bearing their first fruits at between 12 – 18 years. Even then, annual fruit yield varies greatly by individual tree and over time depending upon factors (both genetic and environmental) not yet well understood. Published estimates of production compiled by Hall et al (1996) suggest an overall annual nut production of 500 000 tons. Under average conditions, fresh fruit production per tree per year is estimated to be in the range of 15 – 30 kg with yields reaching 50 kg for very productive trees. However, yield variation is enormous between trees and over time. Individual trees may not produce every year. Production may even be reduced to a third or a half from one year to the next.

A detailed monitoring of shea fruit and nut production (manual counting) was conducted by Boffa et al (1996) in Burkina Faso on over 50 trees during three consecutive years 1993 – 1995. The results showed that production of half of the trees was insignificant, and average yields were almost 5 times higher in 1994 and 1995 than in 1993. In terms of production consistency, 30 percent of trees were found to be virtually worthless, while 26 percent of trees were consistently high producers. Some individuals (13 percent) had alternating high and low yields. Tree genetic traits as well as various environmental factors (bush fires, harmattan dry winds at the time of flowering and early stages of fruiting, rainfall, load of *Tapinanthus* parasites, etc.), are all believed to affect fruit yield and variability but their relative importance are not yet fully understood.

Shea Parklands

Traditionally, farmers across the shea belt have developed land use systems which ensured the sustainable use of the valuable shea resources through a farming system known as parklands. At the time of land clearing for agricultural production, farmers did not cut all trees. They preserved valuable species such as *Vitellaria paradoxa* and nurtured them in the cropped field. In addition to shea trees, other highly valued tree species preserved in parkland systems include fruits trees such as dawa dawa or néré (*Parkia biglobosa*), tamarind (*Tamarindus indica*), baobab (*Adansonia digitata*) or the mythical tree (*Faidherbia albida*) because of its well-recognised ability to improve soil fertility and increase crop yield. The 'anthropic' parklands system now forms an integral and often dominant part of the natural and agricultural landscapes in which the tree grows.

In addition to reducing microclimatic extremes as well as wind and water erosion, parkland trees are important sources of income and nutritional security, producing fruits,

fat, spices, etc. that are used domestically or sold for cash. Yet, the parkland system has long been neglected by modern science and rural development agents, falling in the crack between foresters and agronomists. Foresters have traditionally focused on natural forests or plantations, with little consideration for trees in crop fields, while agronomists have considered trees to be outside their mandate.

Study of parklands in their own right gained recognition only since the end of the 1970s when agroforestry emerged as a scientific discipline with the creation of the International Centre of Research in Agroforestry (ICRAF). Today, the ecological and socio-economic importance of the parkland is widely recognized following the organisation of an international symposium in Burkina Faso in 1993 (Bonkougou *et al.*, 1997) and the publication of country monographs on parklands in Burkina Faso (Ouédraogo, 1995), Mali (Cissé, 1995), Niger (Ounténi, 1998) and Senegal (Sall, 1996).

On-farm trees are an important buffer against climatic risks in rainfed agriculture. During years when annual crop fail because of drought, farm families depend on tree products for food and income. And even during years of ‘‘normal’’ harvest, tree products are the main source of vitamins and minerals which complement the mostly starchy diet of farmers in the region: vitamin A, phosphorus and other minerals from baobab leaves, protein from néré seeds, vitamin C from baobab fruits, etc. Shea tree stands out as one of the most valued parkland tree. During a farmer survey conducted in 1995 by ICRAF’s Sahel Programme to identify the top 15 tree species most valued by farmers in four Sahelian countries (Burkina Faso, Mali, Niger and Senegal), shea ranked first in farmer’s preference in Burkina Faso and Mali (Bonkougou *et al.*, 1998).

Farmers do their selection of shea trees when they first clear the natural bush for agriculture, as well as in later years. Boffa *et al.* (1996) report that 37 percent of surveyed farmers in Burkina Faso distinguish unproductive shea trees using tree conditions: trunk with burn patches or base openings, diffuse foliage, etc. Less desirable trees are cut down, while the preferred ones are maintained in the cropped field (at densities compatible with crop production) and nurtured to optimize the respective yields of crops and tree products.

THREATS TO THE RESOURCE BASE

Shea is adapted to the harsh environmental conditions that prevail throughout its range and is relatively resistant to droughts and mild bush fires. Adaptation mechanisms include a thick and rough bark deeply fissured like a crocodile skin as well as a cryptogeal germination system that maintains the root collar beneath ground level away from the high temperatures that decimate the above-ground parts of the vegetative cover during bush fires. Although fires can severely affect fruit production and even kill young shoots, adult shea trees often survive.

New threats, however, have recently appeared. Throughout the shea distribution range, population pressure for land and wood are now causing increasing degradation of the vegetative cover, including shea parklands. Unlike *Faidherbia albida* parklands which thrive under continuous cultivation, shea parklands regenerate during fallow periods. As these periods are increasingly shortened, shea regeneration faces increasing threats. Inadequate recruitment of young individuals combines with droughts, mechanization and wood cutting for charcoal to degrade existing shea populations. In addition, shea trees are

also threatened by the African mistletoe, a plant parasite of the genus *Tapinanthus* which feeds off shea trees and may cause limbs or whole trees to die. Consequently, there is a risk of shea resources declining even further in coming years.

A study of shea mortality conducted across a land area of 22 to 23 million hectares in Mali found that mortality rates reached up to 16 percent at some locations (Maïga, 1990). The decline, however was not uniform. Good regeneration was observed at favourable sites in the southern range of the study area least affected by droughts. Such detailed studies, however, are rare. Thus, it is difficult to draw definite conclusions about parkland trends across the whole range of the species given the very small number of quantitative reports available. Nevertheless, as Boffa (1999) remarked, the literature is dominated by a general, qualitative agreement among researchers and practitioners that tree densities have declined significantly in Sahelian parklands and woodlands since the droughts of the 1970s. The deficit of young age classes in shea parklands should be a warning of a serious risk of degradation of these systems.

CHALLENGES AND OPPORTUNITIES: IS THERE A CASE FOR IMPROVING VITELLARIA?

The great economic importance of *Vitellaria* as a multimillion dollar industry, coupled with the vital environmental function of the species in the natural and agricultural landscapes are compelling reasons to protect and improve this valuable African resource. With the exception of gum arabic produced by *Acacia senegal*, shea nuts and butter are the only other tree products from drylands in sub-Saharan Africa which are traded internationally to bring substantial export revenues to the producing countries. Thus, shea appears to have the potential to play an important role in African strategies (e.g. NPAD) to promote economic growth, reduce poverty, improve food and nutritional security and protect the environment.

Current shea development programmes and projects focus on the alleviation of key processing and marketing constraints as the way to optimize the economic benefits of shea. Strategic planning on the long term, however, will need to address the issue of resource characteristics (current standing stock and dynamics). At the moment, supply far exceeds demand. A general estimate for West Africa is that up to 60 percent of nuts produced each year are not collected (Boffa, 1999). However, this figure may give a false sense of secure supply. Given the increasing degradation of the resource base on the one hand, and the prospects for future market development on the other, the need to protect the resource base becomes compelling.

Boffa (1999) discussed the issue of whether there is a case for improving *Vitellaria*. With improving prospects for future market development, the need will arise to ensure the regularity and stability of supply and to cater for local and international cosmetic markets for unsaponifiables. Also, there is a potential local market for improved *Vitellaria* fruits (sweetness, high pulp/nut ratio, early or double fruiting, etc.). None of the above demands for shea butter and shea fruits will be properly met if producing countries do not have quantitative information on their resource base or if they continue to rely on entirely wild trees. Thus, although current supply level more than meets current demand, there is a clear need to anticipate future demand and manage the resource base accordingly.

Even though no significant development effort has yet been undertaken on the ground to protect and improve the resource base of *Vitellaria*, several activities have contributed to raise awareness about the local and international importance of the species resources:

- Over the past decade, FAO Panel of Experts on Forest Genetic Resources has gradually promoted *Vitellaria* as an important species for purposes other than wood production. The Panel initially recommended *Vitellaria* for in-situ conservation, then broadened the scope of actions to include botanical and genetic exploration and an appeal for provenance trials to be established. This is a very useful reference when making policy recommendation to governments and intergovernmental bodies on shea resources, or when preparing projects on this topic.
- In 1997, a major research project involving 15 partners from 11 countries was developed on “Improved management of agroforestry parkland systems in sub-Saharan African.” The project, funded under INCO-DC contract of the European Commission, and commonly known as the INCO project, involves 16 African and European partner institutions in activities covering various aspects of *Vitellaria* (and *Parkia biglobosa*), from resource characterization to marketing and processing. Specific activities carried out on shea resources include assessment of biodiversity, selection and improvement of tree performance, and shea parkland characterization and management (Teklehaimanot, 1997). The project has achieved substantive results which have been disseminated in three annual reports.
- Prior to the launching of the above project, two major shea germplasm collections were conducted: during 1985 – 1986 in northern Ghana (Adu – Ampomah et al., 1995) and in 1997 in Uganda and in three Sahelian countries: Burkina Faso, Mali and Senegal (Bonkounou, 1998 and 1997). Both collections were used to establish provenance trials.

CONCLUSION

Shea, or *Vitellaria*, is a dryland tree indigenous to sub-Saharan Africa. The species is highly valued by local communities for food, income and environmental benefits. The tree has also emerged as a multimillion-dollar industry in the international market through export of shea nuts and butter from Africa to Europe, Japan and other countries, making *Vitellaria* a resource of strategic importance for Africa.

Ironically, the well recognised importance of *Vitellaria* contrasts tragically with the relative neglect of the resource base to date. Although the decline of shea has been amply documented across the shea belt, no major effort has yet been undertaken to protect and improve the resource base. Also, the tree remains an entirely wild resource. There are still no productive plantings of the species, or ongoing regional programs for its domestication and improvement. While the tree shows great intra-specific variation, systematic selection for improving product quantity and quality continues to be a neglected aspect of its potential.

This paper has advocated the need for future development programmes on *Vitellaria* to expand beyond processing and marketing in order to cover protection and improvement of the resource base. Areas of concentration should include:

- (i) characterization of the resource base, including quantitative estimates of stocking, biodiversity and productivity;
- (ii) characterization of the extent and intensity of resource degradation;
- (iii) options for sustainable management of shea parkland and control of shea pests and parasites; and
- (iv) domestication activities including:
 - conservation of biodiversity;
 - selection of superior trees based on farmers' preference and international market demand; and
 - horticultural techniques to shorten the tree juvenile phase through breeding and vegetative propagation.

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Conservation of Shea Parklands through Local Resource Management

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ABSTRACT

The practice of protecting and managing indigenous tree resources is an old one in Africa. Twenty to thirty years ago, before deforestation became as severe as it is today, most families living in the shea parklands kept a grove of indigenous trees, including shea trees, adjacent to the homestead. The trees provided firewood, fodder, shelter from winds for the homestead, and poles for construction of houses, kraals and food stores. The shea trees provided fruits and oil used for various purposes including sale for income.

It was and is still commonly accepted that families have rights over the land on which they are living as well as the parklands adjacent to their homestead, where future generations would build their homes. Protecting shea trees on these lands has been one way of registering a claim to the land.

During the 1970s and 1980s, more and more of the shea trees were cut and their regeneration disrupted by fire and grazing. But in recent years, there has been a revival of the practice of protecting and managing Shea trees, as people became increasingly concerned about the lack of trees near their homes and the socio-economic losses due to destruction of Shea trees. In northern and eastern Uganda, some families have begun to protect mature shea trees and re-growth from cutting to allow the trees to grow back. A common concern among the communities living in the shea parklands is the need to bring up children who are aware of the uses and values of shea trees.

This paper examines the factors that lead to local participation in conservation and management of parkland resources. It outlines the factors that need to be considered when planning, developing and implementing local resource management strategies. It is argued that a successful community-based management of shea resources requires a greater recognition of the role that local communities can play in conserving and managing shea parklands. Examples of local resource management systems being used in Uganda and elsewhere are given and suggestions made for enhancing local resource conservation and management efforts.

Keywords: Resource conservation, Shea parklands, Shea trees, Local community

INTRODUCTION

Over the last two decades, global concerns about deforestation, environmental degradation, and poverty that follow in their wake have encouraged governments and ordinary citizens to re-think the principles that have guided the management of natural sources for at least the last one hundred and fifty years (Menzies, 2000). The shea parklands are one of the natural resources that have been affected by uncontrolled exploitation by humans. The parklands, which are mostly found outside protected areas, have been used as common pool resources and degraded by tree cutting, grazing,

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cultivation and bush burning. A major problem with the utilization of common pool resources is that no one is responsible for the state of the resources but everybody wants to gain maximum benefits from them. When the resources are completely degraded, everyone loses the benefits, thus leading to what is known as the tragedy of the commons.

For a long time, pressure for more agricultural land coupled with little benefit obtained from shea trees led to cutting of the trees for firewood, building poles, posts for construction of kraals and food stores, charcoal production, sawing for timber, making tool handles and utensils. The local communities no longer valued the shea trees.

Since the beginning of the 1990s there have been several initiatives by government and non-governmental organizations aimed at conserving the shea tree in the parklands by involving local communities in the management of shea resources. This approach has enabled local communities to have control, authority and responsibility in the use and management of shea parklands. In addition, there has been greater recognition of the important role that local communities can play in the management and conservation of shea parklands. This recognition is premised on the assumption that local communities can make rational decisions and participate in managing resources around them collectively when they clearly envisage net tangible benefits in terms of income, products and services (Ostrom, 1990; Gombya-Ssembajjwe, 2000).

FACTORS THAT LEAD LOCAL COMMUNITIES TO PARTICIPATE IN THE MANAGEMENT AND CONSERVATION OF SHEA PARKLANDS

Much literature abounds on local participation in the management of forest resources, but information that is specific to local management of shea parklands is scarce. Local management of shea parklands can be conceived as a process by which local communities are provided with the opportunity and/or responsibility to manage their own shea resources, define their needs, goals and aspirations and be able to make decisions affecting their well-being. The key issues in the participation of local communities in the management and conservation of shea parklands are the communities themselves, the Shea parklands, community access and control over resources, sustainable resource use, and the existence of a viable community organization. All these issues need to be defined and clearly understood by all members of the community.

Individuals or communities living in the shea parklands tend to derive maximum benefit from the parklands in a short-term without paying much attention to the likely environmental consequences of their actions. However, the communities should be able to decide future needs and benefits without constraining the principles of sustainable management and utilization of available resources. This would be the essence of community-based management of shea parklands. It is clear from literature on community-based management of natural resources that the community must always be guaranteed long-term access to resources and benefits if they are to participate in the management of the resources.

The need to derive maximum benefit within the short-term by either individuals or the community is sometimes caused by tenure insecurity. Successful management of the shea parklands will demand for a greater autonomy and control of shea resources by the local community on a long-term basis. In addition, it will require collective decision-making at

the lowest community level. Although increased resource tenure and access are desirable for local participation in the management and conservation of shea parklands, there are several social problems that may hinder the participation of the local people. First, because shea trees can be used to establish rights to land, it is necessary to consider the resource tenure system in order to avoid the escalation of land disputes. Second, the ability to exclude others from the use of shea parklands, shea trees or products is essential if the community or individuals are to reap benefits of their time and efforts invested in the management of the parklands. However, in many communities, it may be customarily wrong to exclude others from the use of natural resources such as shea trees or parklands. Third, in many regions, community or village boundaries are often not well defined. Lastly, emphasis on management of shea parklands for production of shea nut or shea oil, for example, may destroy rights to other uses of the parkland such as grazing, gathering, and cultivation.

Examples of community-based resource management systems

Conservation of shea parklands through local resource management involves making informed choices. This means integrating the conservation and management of Shea resources into the whole question of development within a country or region. In order to achieve this, there should be consultation between government, the private sector, including NGOs and local people. This consultative process is vital because it takes into account the interests and knowledge of the local people and how to involve them in conserving and managing shea parklands. It is usually better to discuss an issue without reaching a decision than to reach a decision without discussion.

Such consultation process took place in Zimbabwe where the British Government supported the Zimbabwe Trust to undertake wildlife management and other initiatives under its Communal Areas Management Programme for Indigenous Resources - CAMPFIRE. CAMPFIRE works to assist rural communities to develop their capacity to manage their wildlife and natural resources on a sustainable basis and for the benefit of the community as a whole. The initiative stems from the belief that sustainable rural development and the alleviation of poverty in many areas in Zimbabwe can best be achieved through active management of wildlife resources by local communities. CAMPFIRE seeks to offer a completely different approach to development under which wildlife is regarded as the principle resource of local communities. Chiefly through providing rural communities with proprietary rights over wildlife, CAMPFIRE encourages community organizations to use wildlife in a sustainable way and to use the benefits or revenues accruing for meeting community needs. CAMPFIRE therefore promotes local governance and economic self-reliance and increases employment and incomes through the wise use of wildlife resources.

The second example of community involvement in natural resources management is the management of Uganda's national parks with the local people through the Park Management Advisory Committees (PMAC). PMAC is a community-based institution whose membership comprises park managers, district officials, and local community representatives. The committee exercises control over the use of resources in national parks using guidelines developed together with the local people.

The third example of community-based management of rural resources is Collaborative Forest Management (CFM) also known as Joint Forest Management (JFM). A change in the Forest Policy of many countries e.g. Uganda, Kenya, Tanzania, Gambia, India, Thailand and many others, has allowed for the participation of local communities in the management of forest reserves. In Uganda, the Forest Department has institutionalized community forestry within its operations at all levels (Gombya-Ssembajjwe and Banana, 2000). Staff capacity at all levels is being strengthened to manage community forestry. To help local communities effectively manage forest resources; the Forest Department is giving back 40 percent of the revenue collected from the forest reserves within a sub-county to the community as incentives.

The Uganda Constitution of 1995 has granted local administrations the right and responsibility of managing forest resources for the benefit of the local people. The 1998 Local Government Act further gives legal authority to local governments to establish and manage small forests on public land to meet the needs of the local people. The same Act establishes local committees/councils to govern natural resources. The local committees/councils have the power and authority to plan and manage the local forest resources in their areas. The 1998 Land Act stipulates that where any group of persons holds land communally, the land may be held on behalf of the group by a trustee chosen by the group, according to the customs of such a community. This provision permits the registration of communal land and the management of forest resources as common property.

RESOURCE MANAGEMENT IN PROTECTED AND UNPROTECTED AREAS

The major characteristics of resource management in protected and unprotected areas are given in Table 1 below.

Table 1. Characteristics of resource management in protected and unprotected areas

Protected area	Unprotected area
Local committees usually formed to control resource use	Individuals or community exercise control over resources
Resources are exploited in community use zones	No demarcation of resource areas. Resource is common property and there is open access
Rules are set by a government agency or community to regulate resource use	Local rules may be set but are often not effectively enforced
Access to resource use is restricted by Law or Act	By law or local rules may be applied to protect resource e.g. starting bush fire is prohibited

Principles of local resource conservation and management

The following are the key principles of local community participation in the conservation and management of Shea parklands:

- Local communities must recognize the value of Shea parkland's resources.

- Local communities must have positive attitudes and be willing to manage the resources.
- Local communities must be sensitized about their roles and responsibilities, as well as the condition of the shea parklands.
- The capacity of the local communities to manage must be evaluated in terms of the knowledge and experience they possess. This will help to identify the gaps that should be filled during capacity building which may include training, institutional development, and information generation and dissemination.

Where an agency such as an NGO takes a lead in initiating local resource management, the intentions of the agency must be clearly known to avoid depriving the local community of the benefits from the resource.

HOW LOCAL EFFORTS TO CONSERVE AND MANAGEMENT SHEA RESOURCES CAN BE SUPPORTED

Research: helps to provide information on the status of the resource, for example, changes in the population structure of shea trees that have occurred over the years. The information may be used to recommend measures that would ensure sustainable utilization of the resource as well as how to maintain the resource base.

Market development: there is a need for creation of good markets/marketing channels for shea products. Good markets provide incentives to local people to conserve, manage and use shea parklands wisely.

Product development: there is a need to support local communities to acquire simple and affordable technology for processing and packaging shea products. In this way value is added to the shea product and consumers' confidence to buy and utilize the products are maintained.

Financial and human resources: this is needed for undertaking research, developing the market and the product and mobilizing local communities to conserve and manage shea parklands.

Local conservation and management of Shea parklands: experiences from Uganda

The conservation and management of Shea resources in Uganda can be classified into identification of desired qualities, propagation, tending, protection and ownership. A study done by COVOL Uganda under the Shea Project for Local Conservation and Development (The Shea Project) indicates that local communities in eastern and northern Uganda living in the shea parklands cannot identify a good shea tree before it starts fruiting. However, some farmers claim that good seedlings usually have large light green leaves with good vigor (Figure 1). Others identify good Shea trees on the basis of fruit yield thus corroborating two verses in the Holy Bible (Mathew Chapter 12 verse 33 and Luke Chapter 6 verse 43) which say ... "to have a good fruit you must have a healthy tree. If you have a poor tree you will have bad fruit. A good tree is known by the kind of fruit it bears". In eastern and northern Uganda, it is claimed that a higher oil yield is obtained from shea trees that produce sour fruits, although sweet fruits are generally preferred for eating as snacks.

The same study revealed that farmers lacked basic knowledge of Shea tree establishment. COVOL Uganda has been addressing this problem through research into the vegetative propagation of shea tree. Ten shea trees per hectare are considered to be the optimum number of trees that can be kept on a farm.

Tending operations are limited to pruning heavily branched trees to reduce the effect of shading on agricultural crops. Trees are also be lopped (Figure 2) to keep away birds from perching on them thus reducing the risk of attracting birds that eat and destroy grain crops such as millet and sorghum. The branches that have been cut are used for firewood.



Figure 1. Healthy Shea seedling tree



Figure 2. Lopped shea tree

Shea trees are protected in various ways such as sparing during cultivation, weeding around the seedling/sapling/tree to prevent fire from burning it, practicing prescribed early burning to dispose off combustible dry biomass before the bush fires are set, and enforcing local rules and bylaws that forbid cutting shea trees. Local beliefs and culture also help to protect shea trees from unnecessary cutting. One of the key cultural reasons given by communities in northern Uganda is that shea trees should not be cut because elders use shea oil for smearing new-born babies and their mothers as a sign of blessing.

Various types of fines are also imposed on those who cut shea trees, *e.g.* by paying Uganda shillings 5 000, or by giving a goat or a cow to the owner of the shea tree cut.

Ownership of land and shea tree is a significant factor in the conservation and management of shea trees. In eastern and northern Uganda, land is mainly under communal ownership. Sons inherit land and shea trees growing on the land from their fathers and shea trees growing on family land generally belong to the family.

CONCLUSIONS AND THE WAY FORWARD

There is a need for greater recognition of local participation in the conservation and management of shea parklands.

The need to conserve and manage Shea parklands and develop shea resources for poverty alleviation should be recognized and incorporated in government strategic planning and development frameworks such as Poverty Eradication Action Plan (PEAP) and its key element - the Plan for Modernization of Agriculture (PMA).

Development of Shea resources should be included in the Sector-Wide Action Plans of the Ministries in charge of Agriculture, Environment, Planning and Economic Development.

Concern about shea parklands should not be left only to institutions such as FAO and CFC. Institutions such as IUCN, WWF and UNESCO should also become involved in promoting shea resources and ensuring sustainable utilization of resources from shea parklands as part of the global concern for sustainable natural resources management.

At the international level, there is a need for establishment of an International Shea Research Institute (ISRI) with finding and human resources support at the level of the CGIAR member institutions such as ICRAF, IPGRI, CIRAT, IITA etc.

At the national level, there is a need for countries having Shea parklands and resources to set up a Shea Resources Research Institute (SRRI) or Shea Research Foundation (SRF) at the level of the Coffee Research Foundation in Uganda or the Cocoa Research Institute in Ghana.

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Women and the Shea Resource: Issues of Ownership and Producer Equity

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In spite of the ascendancy of the women in the shea sector and their responsibility for the processing of shea butter, the incomes which they obtain from shea-based activities are often insignificant and unremunerative in consideration of the arduous nature of the work involved in shea processing.

Indeed, the many laborious stages in the process of transformation of the fruits of the tree into the final product are all considered the domain of women, including collection and de-pulping of the fruits, shelling, drying, grinding of the nuts, roasting and kneading (*barattage*) of the nut-paste [according to the West African process], extraction and packaging of the shea butter for the sale. In spite of their technical expertise, the duration and difficulty of the work, rural women obtain minimal returns for their efforts.

In spite of some successes due to different projects of development which aim at strengthening the powers and the resources of the women in sectors (for example in Burkina Faso and Benin), the majority of the women involved in the shea sector can not improve their living standards based solely on the returns from shea production and processing. Several factors continue to limit the economic power of the producing women.

In order to understand the problem and diagnose possible solutions, it is advisable to start by asking the following questions:

- Who produces?
- Who produces which particular products?
- Who sells these products?
- Who controls the profits of their sale?
- Who owns the lands on which the tree grows? Who owns the trees themselves? Who has the right to their harvest? (Issues of ownership and tenure can be very complicated and site-specific; land often belongs to - or is controlled by – men and not women).
- What are the current or potential conflicts regarding equity and ownership?
- What limits the profitability of production and processing?

BOTTLENECKS

Lack of professionalization of the shea sector (*filière*)

1) In terms of quantitative and qualitative production:

- Limited technical capacity; lack of awareness of improved production and processing techniques; professionalization of the women who specialize in shea processing.

Women should have the capacity to produce a shea butter meeting the requirements of international users, who rely on specific quality criteria including of acid value (FFA), moisture content and level of impurities.

- The labor investment and arduous nature of processing is due in part to the lack of tools and techniques of improved production and processing.

2) Problems of increasing product value (*valorization*)

- Capacity for increasing returns and profitability of production and processing: this includes value added in shea butter extraction, formulated products based on shea butter, as well as the value of by-products including the fruit-pulp, shell and press-cake or residue, all of which might generate further revenues through product diversification.
- Problems of added value, (*e.g.* price differentiation according to product quality).
- Problems of packaging.

3) Problems of financial remuneration and other market factors

- Commercial intermediaries (often men) commonly retain the largest proportion of profit along the product marketing chain. Wholesalers, traders, brokers and exporters each develop strategies to squeeze the maximum of profit from each transaction, to the ultimate detriment of the producing women.
- Issues of availability: Increasing nutritional and industrial demand for shea butter on the international market, both as edible oil and in the cosmetic sub-sector, could lead to over-exportation resulting in scarcity of shea kernels.
- Problems of product marketing: The international trading companies, by volume purchases through their intermediaries of the significant quantities of kernels (and this at absurdly low prices), tend to disrupt the processing of sheanut by women. These companies tend to concentrate their purchasing contracts at the precise moment of greatest supply, immediately following the annual harvest (in July, in August, in September), which tends to minimize prices paid to the producers for the raw material.
- Difficulty to access to the market (local and international).
- Lack of financial means necessary to procure a sufficient volume of the raw material.
- The fluctuating price of shea kernels.
- Lack of organization of the shea sector (*filière*) enable exploitative purchase of the raw material for export.

4) Problems of limited capacities

- Limited storage capacity of sheanut.
- Limited capacity for organization of producers: Plethora of individual producers or producers in small groups, unorganized; multitude of intermediaries.
- Limited capacities for negotiation by producers.
- Limited capacity to derive value from technical knowledge.
- Limited capacity to maximize the economic returns from production.

5) Logistic problems

- Labor-saving technologies are not commonly available [in West Africa], so processing is still done manually. Major investments of female time and labor required; exacerbated by the arduous nature of the work itself.
- Material handling and storage facilities - kernels and butter are two perishable products.
- Lack of tools and production inputs, materials and equipment.
- Sometimes delays between grinding of kernels and extraction.
- Limited means of transportation: long distances to be covered during the collection of nuts.
- Problem of limited time (time competition).

QUESTION OF THE VIABILITY OF THE ACTIVITIES OF THE WOMEN IN THE SECTOR

Women's incomes from shea production and processing is not sufficient to increase the decision-making power of the woman. Earnings commonly used to meet basic household requirements during periods of scarcity. This means that the woman can not invest her little income productively in order to scale-up her activities. Too little or no savings, which can allow in women more autonomy and efficient use of resources.

Ideas derived from a diagnostic analysis of the shea sector in the provinces of Houet and Sissili (Burkina Faso), January 1998

The supply of kernels is essentially assured by the women, the men have come to play an increasingly active role: in Sissili, according to cultural norms of the village, the men collect nuts and entrust the pre-treatment [parboiling of the whole nuts] to the women. Despite the importance of women's labor in processing of sheanut, men control the proceeds from the sale. In Houet, cultural traditions (Bobo, Tuéfo) dictate that the kernels from cultivated (family) fields belong half or completely to the head of the family who manages the land; certain men resell their products in women (case of Péni).

- The property or the management of a part of kernel by men according to the cultural traditions of specific ethnic groups and regions.
- Women's time: in Sissili, the importance and time-specificity of shea production is officially recognized by society, and consequently the woman does not cultivate during the period of collection of the shea harvest.
- Price fixed by the store-keepers and wholesalers (nationals of Burkina Faso) and dictated to the producers. Informal dialogue between store-keepers to fix the prices.
- Both men and women involved in marketing. Women are more active in the shea butter trade, and the men in shea kernels.
- Problem of credit sales: in Houet (at Péni), shea butter is regularly sold on credit – commonly in non-compliance with the terms, with the result that (eventual) payment is simply split among accrued debts by the vendor.

Decomposition and variation of the price of kernels (in CFA/kg):

- | | |
|--|----|
| ➤ Price to storekeepers wholesalers | 60 |
| ➤ Price to employed collectors (traders) | 50 |
| ➤ Price to buyers or local collectors | 40 |
| ➤ Price to Producers | 30 |
- Dominant role of men, especially at the level of kernels and of external markets, with regard to the women.
 - Remuneration to the producers is derisory, particularly in relation to the labor invested.
 - Lack of attention to proper storage techniques for conservation of high-quality shea kernels.

Questions which it will be necessary to address

- Access and control of the resources (aspects of tenure and equity).
- Problem of arduous labor requirements in processing.
- Access to the improved processing technologies.
- Problems of market access (at various levels).

Strategies for the Conservation and Improvement of the Shea-butter Tree (*Vitellaria paradoxa* syn. *Butyrospermum parkii*)

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INTRODUCTION

The shea-tree is indigenous to the Sudano-Sahelian zone of Africa, the area of distribution of which extends from Senegal to central and eastern Africa. The shea populations of Senegal are situated in the western limit of this area of distribution. The shea tree is a very important woodland species, highly valued in consideration of its nutritional, economic, cultural and ecological significance.

The species often occurs in dense natural stands in undisturbed woodland, in fallow land and in land under cultivation. From this point of view, the species benefits from a relative protection under traditional farming systems, with resulting benefits of mitigation against soil erosion and degradation.

From an economic perspective, the main product of the shea tree consists of shea butter, which is extracted from its seed kernels, the fat content of which is on the order of 55 percent. Shea butter is used traditionally in the preparation of food, the manufacture of the soap, in medical care, as an illuminant, and for cosmetic uses including skin care, particularly by women and infants.

The butter is made traditionally in West Africa by crushing of the kernels and separation of the oil by addition of warm water and settling. The traditional process yields about 15 to 20 percent, but partly industrialized improved technologies allow for yields 2-3 times higher than this. The fruit itself becomes an item of commerce precisely during the annual period of nutritional deficit and agricultural labor corresponding to the beginning of rainy season.

Various parts and products of the shea tree are highly valued from a cultural perspective. Some cultures in Senegal use the leaves of shea tree to fashion traditional garments known as kankouran, used in ceremonies of initiation.

In such a context, the conservation of the resource and the improvement of the useful attributes of the species could contribute to fight against rural poverty, while maintaining a high level of woodland biodiversity.

CONSTRAINTS

We are forced to recognize that our forests gradually lose their productive capacity, and the ecological integrity of forests and woodland has become more and more threatened. Indeed, degradation of the natural stands seems to accelerate because of the conjugation - with a multiplier effect - of practices destructive to the environment: overexploitation, deforestation, etc. This trend is exacerbated by a persistent deficit in rainfall, which itself increases the fragility of our ecosystems. In spite of the economic importance of the

exploitation of the shea tree to the national economy, there are risks regarding the future of the species in the zones of production. Among these constraints, some are related to the reproductive biology of the tree, and the others are essentially anthropic in nature.

Biology of the species

The growth of the shea tree is extremely slow. Indeed, the first yield of fruit takes place when the tree has between 15 and 20 years of age. It is primarily for this reason that the species is rarely planted during reforestation campaigns. Besides, it should be noted that the seeds of the tree are highly recalcitrant; which presents a problem of medium-term conservation of the species through natural regeneration.

Cutting and clearing of the shea tree

The practice of the extensive agriculture and increasing demographic pressure are factors which lead to cutting of the shea tree in Senegal. Indeed, diminution or even a disappearance of the fallow period has led to declining soil fertility, and has placed additional pressure on natural regeneration of the species. On land under cultivation, the young shoots of the tree are often cut by the plough or trampled by cattle.

Brush-fires

Uncontrolled annual brush-fires constitute a real plague in consideration of their recurrence, their amplitude and their intensity. Among other consequences, brush-fires lead to degradation of the physico-chemical properties of soil including elimination of the organic layer, and disruption of the regeneration of indigenous woodland species. In addition, there is reason to for concern regarding the genetic erosion of intra-species biodiversity in *Vitellaria*, which could result from reduction of the populations and area of distribution of the tree, due to fire and other pressures on regeneration of the species.

Exploitation of woodland resources

Faced with continuous decline of the agricultural productivity over time, rural populations turn more and more to the exploitation and the marketing of fruits of shea-tree. In areas where collection of seeds is competitive, the pressure on natural regeneration of the tree – and thus renewal of the resource - becomes unpredictable.

Aside from these constraints, inadequacies in legal measures to legislate protection of the species – and in the ineffective or inconsistent enforcement of existing regulations.

OPPORTUNITIES

In spite of the current pressures which threaten the shea tree, we must recognize that there are opportunities to raise the value of the shea resource – and thus provide (or reinforce) an economic incentive for preservation of the species.

Natural regeneration

The strong tendency for coppice growth from the stumps of cut trees constitutes an effective means of conservation of the resource. Besides, the seeds of the sort germinate relatively well in undisturbed conditions; which opens a way for facilitation of assisted natural regeneration.

Agroforestry parklands

The protection of the shea tree in fields under cultivation promotes conservation of the species. This leads to increased exploitation of the productive value of indigenous woodland species by every farmer, as for example of tamarind.

Market demand

Considering the economic importance of the shea tree, the demand of the international market is difficult to satisfy. Therefore, existing financial opportunities can result in improved organization of the shea sector (filère), and may serve as an economic incentive for conservation of the natural populations of *Vitellaria*.

PERSPECTIVES OF CONSERVATION AND IMPROVEMENT

In the light of the identified constraints and on the basis of the existing opportunities, it seems urgent and necessary to define a plan which might reconcile the imperatives of conservation and improvement of the shea tree.

Conservation

- It is imperative to define plans of action for sustainable woodland management based on objectively verifiable indicators for monitoring and follow-up, in order to guarantee steady economic returns while protecting the resource. Indeed, it is important to establish a monitoring system for follow-up and control, in order to ensure that exploitation is effectively compensated with the renewal in order to avoid a process of irreversible decline of the resource. Such an option will necessitate a practical dialogue involving participation by all concerned stakeholders, in order to harmonize strategies and to address issues of resource tenure and ownership.
- It is evident that the establishment of an agricultural map, integrating agro-ecological characteristics and land use potentials, would facilitate the sound and sustainable management of soils. Indeed, adoption and enforcement of local land and resource management plans would mitigate the effects of demographic pressure on the land.
- The protection of the natural regeneration of the agroforestry parklands would contribute to conservation of the genetic resources of the species.
- Besides, local communities and advocacy groups should be empowered with the necessary management tools required to increase the efficiency of their interventions.
- The establishment of protected genetic reserves of maximum diversity would enhance the long-term conservation of the resource.

Strategies for improvement

The main criteria for selection of the shea tree are the quality and the quantity of produced fruits and a steady production. For this purpose, it is important to first document the level of variability of the species to better direct the selection of superior germplasm. Generally speaking the strategy of improvement should focus on the selection of successful individuals on the basis of the defined criteria. Also important will be:

- The mastery of techniques of vegetative multiplication.
- The introduction of specific provenances selected so as to broaden the genetic base.

AREAS OF RESEARCH

The main areas of research for the development of the shea tree in Senegal may be summarized as follows:

- Characterization of the populations.
- Evaluation of the intra-species variability and favored attributes.
- Knowledge of the biology of the species.
- Optimization of the techniques of vegetative multiplication (grafting in particular).
- Agro-ecological studies of parkland farming systems.
- Improvement of the assisted natural regeneration of *Vitellaria*.

POTENTIALS FOR COLLABORATION

Considering the complexity of the issues related to the conservation and improvement of the shea tree, collaboration among all the stakeholders of the shea resource is a necessary pre-condition for the success of any sustainable management strategy. At the national, regional and international levels, stakeholders of the shea sector should participate in a constructive dialogue in order to define and prioritize areas of concern for sustainable management of the shea resource. This framework of reflection will further serve to distribute the necessary tasks according to the capabilities and comparative advantages of the participants, for planning and coordination of priority activities, for documenting program impacts, and to mobilize the necessary resources for implementation of successful interventions in pursuit of common objectives.

An inclusive and participatory approach to the sustainable management, conservation and improvement of the shea resource will enable the primary stakeholders to take on a long-term custodial responsibility for the resource based on their own decisions and in harmony with their economic and social interests. This process must be based on the establishment of a reliable contract between local communities and government departments which provide technical services.

The necessity of placing communities in the heart of the development process should not be construed as a total disengagement of the government technical services, which should continue to provide their indispensable support in the management of the natural resources of forest and woodland. Respect for the existing statutory regulations by all

stakeholders constitutes a necessary pre-condition in order to maintain the effective coherence of various interventions.

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The Benefits of Shea to Rural Households, Communities and Nations

by

Mme Ladi Ziba² and Mme Félicité Yameogo³

The Shea-butter tree (the botanical names for which are *Vitellaria paradoxa* or *Butyrospermum parkii*) is for some African countries where it grows - and more particularly for Burkina Faso - what one can call without exaggeration a "miracle tree". Miracle tree, because so many useful products from the shea tree provide a veritable treasure-trove of benefits for the people of the countries in which it grows, and make an important contribution to a number of national economies.

The leaves, roots, bark and even the plant parasites of the shea tree are used in traditional medicine to treat various diseases. For example, a powder made from the leaves of the tree is mixed into a paste with shea butter, which is used to treat cough and digestive difficulties in children.

In the region of Sissili in western central Burkina Faso, the shea tree is protected by the traditional custom in respect of its myriad benefits. The sale of its leaves, roots, or fruit is forbidden by tradition. However, to a certain extent, traditional healers (*féticheurs*) use the roots of the tree to formulate very popular medicines, which are afterward sold to local patients. The sale of these traditional medicaments constitutes a significant source of income for these persons.

The dead or green wood is used in construction, as fuel-wood or is converted into charcoal which both men and women market. This small business especially of charcoal provides a source of incomes for rural populations during the dry season when there is little agricultural work to be done.

The shells of the nuts and nut residues from processing are also used as fuel.

The pulp of fruits is very nourishing. From May till September – during the annual 'hungry season' fruits are the delight of children but also men and women. During a season when agricultural labor demands are high, shea fruit provides a "breakfast" for the women and the children who go to the fields clear and plant very early the morning, and later a lunch for the cultivators in fields.

Shea butter, which is extracted from the seed of the fruit, has been consumed since ancient times by African peoples. It is the main source of edible fat in rural areas; and is commonly used to prepare sauces and for frying. In addition to its nutritional value, shea butter is also used for the care of skin and hair, and in traditional medicine.

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Another nutritional resource from the shea tree comes in the form of caterpillars [*Cirina butyrospermii*], which are common in the southwest of Burkina and the consumption of which is highly appreciated by the local populations. The caterpillars are fried to provide a nourishing snack for children.

These various products are mostly consumed directly by rural households, but they also provide an important source of income for the rural producers and urban operators including traders and storekeepers and export agents, as well as processors. Sheanut, shea butter and soaps based on shea butter have become important items of trade on the local, regional and international markets.

For its contribution to rural households and to the livelihoods of the various stakeholders, and the economic benefits which accrue to communities and nations, we do appreciate the benefits of the shea tree.

At the level of the rural producers and their households

The shea sector in Burkina Faso is based on the (long and painful) work of thousands rural women, which is invested in all the stages of the cycle of production, transformation and marketing of the shea products. The economic returns to producers are not always proportional to the amount of labor they invest in production, but this situation has begun to change in some areas.

Indeed, recent and current development projects have been implemented, and institutional structures established within the shea sector of Burkina Faso (including PMR, PFFK, PACK, PAF, PNK, etc.), for:

- building the organizational, production and management capacity of producer groups;
- linking the producers with profitable markets at the national, regional and international levels;
- implementation of programs in support of the shea sector, e.g. training programs in collection, processing, packaging of shea products, and production of quality sheanut and shea butter; systems of credit and commercialization;
- various promotional activities (trade fairs and sales exhibitions).

The producers have become more fully aware of the economic value of the shea tree and more confident in their abilities to trade on markets beyond those of their villages. Bit by bit, they are getting better organized in order to face together the challenges of production and marketing.

Taken together, these recent developments have resulted in an increase in the consumption of shea butter by Burkinabe households in recent years, with a corresponding increase in the popularity of shea butter in the European food, cosmetic and pharmaceutical industries. The social and economic effects of both trends are beginning to be felt.

From a social perspective

Prior to these recent developments, the production of the shea butter was only a secondary activity for rural women. Throughout the week during the harvest season they collected the nuts, which they stored in order to process on their day of rest. Sales were occasionally made when women needed money for immediate expenses, while income from agriculture in fields constituted the main activity for the women. The production of shea butter mainly for household consumption or given away, while only a small proportion was sold. Nonetheless, women did not shy away from this task, from which they could derive an additional source of income.

Today, the production of the shea butter constitutes the main activity of the women, and the destination of the butter produced has changed significantly – the order of priority now being production for sale, household consumption and gifts. Though agriculture continues as always, the marketing of shea butter provides rural women with substantial incomes, which can allow them to hire local labor to cultivate their fields. They are thus able to devote their full time to their activities of shea production.

From an economic perspective

In addition to commercial interest from within the sub-region (Côte d'Ivoire, Mali and Ghana in particular), producer groups of Burkina now fill orders from French, Dutch and American customers, etc.

For period 2000-2001, the sale of the butter and the shea kernels brought more than CFA 167 000 000 to about fifty producers' organizations affiliated to the Project of Support for the Marketing of Shea (PACK).

These figures do not take into account the numerous direct sales realized by these groups of women processors. On average, a producer of the Union of the Producers of Sissili, of which I am a member, can earn a profit of 1 500 to 5 000 CFA a week. This implies an additional revenue of CFA 1 785 000 to 5 950 000 which is re-invested in the local economy.

Incomes earned by the sale of shea products are mostly spent on improvement in household living standards: purchase of foods for the family notably during the annual 'hungry season'; family health care, clothing, education, etc.

For the producers, the execution of increasingly large orders and for a variety of new customers has brought about an increased awareness of the importance of shea processing as an economic enterprise, as well as its requirements. This has contributed to a certain empowerment of the producers, resulting in a greater confidence that they can achieve a better mastery of their problems; an increase in their productive capacities, and a 'team spirit' among the producer groups. They are more and more sought to participate in seminars and international events to share their experiences, as well as in fairs and exhibitions within the sub-region.

Women's role in society

The social role of the women who produce shea changes very gradually in rural communities. Because these women now obtain incomes from shea production which allow them to participate in the financial support of the family, they are consulted more by their husbands in decisions concerning the household. Thus women take a more active role in decision-making, and greater responsibility for support of the household in a more equal partnership with the increased confidence of her husband. He “knows that he can count on her”.

Rural livelihoods in producer communities

The benefits of the shea tree are multiple, and increasing demand for shea products brought about numerous other applications and income opportunities with significant impacts in the other sectors of the local economic and social life. Thus:

Many young people and adults collect shea fruits and/or nuts for sale.

- More and more women drive their livelihoods from the production and processing of nut and shea butter.
- Private individuals and women's groups have obtained labor-saving technologies such as machines for grinding sheanut.
- In the production of good quality shea butter, the income-generating activities of individuals and community-based groups have been established, from collection of products for resale to storekeepers, export agents, processing industries, manufacturers of shea-based soap and cosmetics, etc.;
- The salesmen of packaging materials (bags, trunks, and buckets), the carriers, the salesmen of products entering the manufacture of the soap, etc., have increasingly more business with shea producers.

Increasing revenues from the sale of shea products are injected in the local economic circuit, used for the purchase of production equipment, food, to hire agricultural labor, to meet the needs of family healthcare and education, and for taxes, dues and revenues which support collective structures.

Development of the shea resource has aroused in the communities of the shea zone an awareness of the value of the shea tree, and the necessity of protecting the species. Recent work has made possible the promotion of certain renowned regions as areas of particularly strong production of quality shea butter for various or specific applications. This trend contributes greatly to the well-being of rural communities.

At the national level

The benefits of the shea tree demonstrate themselves through:

- the creation and development of dynamic and prosperous national industries companies working with shea products or producing shea-based products for the national consumption or for the export;

- the contribution of state revenues for the countries which produce and export sheanut and shea butter.

In the case of the Burkina Faso, the sheanut is the third product of export of the country, it contributes - and can contribute even more - to economic growth. The shea-tree can be a powerful tool in the fight against poverty, particularly for rural women, if the current growth and development of the shea sector is structured fairly.

We thank you.

Overview of Post-harvest Handling, Processing and Storage of the Sheanut in African Countries

C. Kapseu⁴ and D. Ngongang⁵

ABSTRACT

Shea (*Vitellaria paradoxa* syn. *Butyrospermum parkii* [G. Don] Kotschy) is a plant of the family of Sapotaceae. It produces fruits, the nuts of which yield a butter characterized by a great variability in its physico-chemical properties: density (0.91-0.98), melting point (35-40), iodine index (50-80), unsaponifiable matter content (2-17%). The adsorption and desorption isotherms of sheanut have been determined. Storage conditions significantly affect adsorption isotherms. Sheanut should be stored a moisture content from 8 to 12 percent in order to maximize product quality for the longest possible time. Socio-economic aspects of the shea resource are also reviewed in the present work. The lack of standard technologies which increase yield to the women producers limits the improvement of sheanut processing.

Keywords: *Vitellaria paradoxa* syn. *Butyrospermum parkii*, butter, sheanut, women, isotherms, business

The Shea-butter tree (*Vitellaria paradoxa* syn. *Butyrospermum parkii* [G. Don] Kotschy) is a plant with multiple uses *par excellence*. Its importance for the microeconomic level is exemplified by its nutritional value (the pulp of the fruit and the fat of the kernel, known as shea butter), its use in health-care and traditional medicine health (butter, leaves, bark), energy (fuelwood) and construction (deadwood and lopped branches). The shea tree is also important at the macroeconomic level, as the export of shea kernels and shea butter constitutes a major source of revenue for countries as Burkina Faso and Mali (Nianogo *and al.*, 1997a and b). Shea products are processed mainly by women, what confers to them an unmistakable importance from a social perspective.

For some years, shea has effectively been promoted to the rank of an export crop. Indeed, the European Union has authorized the substitution of vegetable fat (in particular the shea butter) for cocoa butter in the manufacture of chocolates. The substitution level is already eight to 15 percent; in fact substituting oils are 10 to 40 percent cheaper.

Though in Cameroon, sheanut was exported during the 1930's on the order of 400 tons (Kabore and Gadiaga, 1991) today it is only farmers who exploit the shea resource - mainly for household consumption as a food oil, only occasionally deriving from it a small income.

The object of our study is to identify the potentialities of the shea sector and to estimate the socio-economic implications of the resource. The shea butter constitutes one of the main edible fats in rural areas, and as such, the shea sector plays an important role.

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Our study will examine at first the treatment and storage of sheanut and the extraction of shea butter; will then address the economic implications and will conclude with recommendations for improvement of the shea sector (*filère*).

I. TREATMENT

Geographic area of the shea tree and elements of botany

The shea-tree is known by many local names in the vernacular languages of the region. This testifies not only to its of very vast area of distribution, but also its importance for the local populations as illustrated in Table 1 below.

Table 1: Names for the Shea-butter tree in some vernacular languages of Cameroon

Vernacular Name:	Ethnic group / Language
Karehi	Foulbé
Oum kouroum	Aboum gatou
Kol	Gbaya
Kekombichop	Bangangté
Kelé	Koma
Sougoum	Gouim
Soro	Mbo

The shea tree is indigenous to more than 16 countries, including Senegal, Gambia, Mali, Burkina Faso, Niger, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Central African Republic, Chad, Sudan, Ethiopia and Uganda, with a few stands in Gambia and the Democratic Republic of Congo.

According to botanical classification, the shea tree has been known by a variety of specific designations over the years: *Vitellaria paradoxa* by van Gaertner in 1807, then *Bassia parkii* by George Don in 1838, *Butyrospermum parkii* by Theodore Kotschy in 1865; *Butyrospermum paradoxum* by Hepper in 1962, and finally, since 1966, by van Gaertner's original *Vitellaria paradoxa*, of the family Sapotaceae.

Physio-chemical properties

Table 2 presents the physio-chemical characteristics of shea butter.

Table 2: Physio-chemical characteristics of shea butter

Parameters	Renard (1990)	Kapseu <i>et al.</i> (2000)	Pontillon (1992)	Gunstone <i>et al.</i> (1986)
Density at 20 °C	0,91 - 0,98	0,900*	0,900-0,902*	
Point of Fusion	35 - 40 °C	40		
Index of Refraction	1 4620			
Slip Point	23 - 25 °C			
pH	6,9			
Saponification Value	170 - 190	180	178 - 193	178 - 190
Acid Value (FFA)	Maximum 3% as oleic acid			
Polarimetric Deviation	+ 2° 34			
Iodine Value	50 - 80	55	52 - 66	53 - 60
Peroxide Value	Maximum 10 meq O ₂ /kg			
Acid Index	12 - 14			
Unsaponifiable Content (%)	3,5 - 8 to as high as 17%	5,9	7 - 11	2 - 11
Waxy Esters	7%			

*Density at 40° C

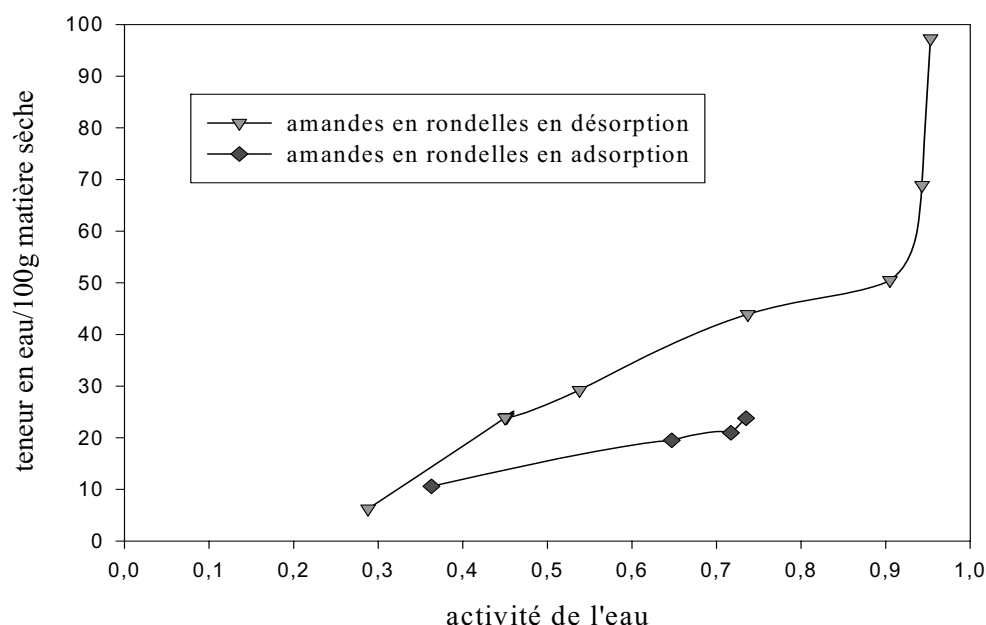
It emerges it that these properties vary according to geographic origin and the method of extraction. For cosmetic applications in particular, it necessary to indicate the unsaponifiable content.

II. STORAGE OF SHEA KERNELS

The device used for the measure the moisture content of sheanut is a laboratory ohmmeter [an instrument which measures electrical resistance], which consists of a chamber of analysis into which one introduces a small dish containing the sample to be studied (Kapseu *and al.*, 2001).

The figure 1 gives the isotherms of desorption and of adsorption of shea kernels. The adsorption is measured in conditions of ambient temperature (25°C) and does not reach a certain value (superior to 0.75). It is advisable to store shea kernels with a moisture content of $10 \pm 2\%$ this corresponds to an activity of water of 0.3 to 0.5.

Figure 1: Isotherms of desorption and adsorption of shea kernels at $25 \pm 2^\circ\text{C}$



The collection of ripe fruits fallen on the ground is generally assured by rural women and the children, over a harvest period of about 3 months. The fruit pulp surrounding the nut of is either consumed raw, or wasted by fermentation. Kernels are then dried mostly in the sun **for 1-2 weeks**, until they are ready for the manufacture of the butter or for the consumption.

The processing and extraction of shea butter is done by women, in addition to the agricultural work which takes up most of their productive time. The marketing of the shea butter takes place mainly in the rural markets. Commercial distribution of shea butter makes the product more accessible to the consumer (Maricourt and Olivier 1990). This is undertaken by women not involved in production, as well as storekeepers and retailers.

III. THE ROLE OF WOMEN IN THE SHEA SECTOR

The study of the field shows us that the woman plays a crucial role in the shea sector, based on the following four aspects:

- **Tradition:** In Africa, the work of extraction of shea butter is generally reserved for women;
- **Arduous Labor:** Current extraction methods rely on artisanal technologies based on traditional technical knowledge. They are well-established and consistent, based on repeated gestures and very simple instruments. These traditional extraction methods all require significant investments of difficult and laborious work. By some

estimates up to 12 working hours are required in order to obtain 1 liter of shea butter.

- **Inputs:** The extraction of shea butter does not require (demand) important means: pestle, mortar, grater. Generally in Africa, the activities requiring not enough means are reserved for the women because of their weak economic power.
- **Economic Returns:** The extraction of shea butter is poorly remunerated (GRET 1984). In the North Cameroon, 1 liter of shea butter is sold for about CFA 500 in the rural areas.

IV. ECONOMIC IMPLICATIONS

Although numerous studies have been conducted on the shea tree, few address the social role of the resource, and its contribution to the reduction of the rural poverty. The economic implications of the shea sector will be examined at two levels of activities, to include both the extraction of shea butter and the distribution of shea butter to urban markets.

Shea products are commercialized both in the raw state (kernels), as well as shea butter produced using artisanal methods and industrially.

Marketing of shea kernels

In the rural production areas, women are both the sellers and the buyers of shea kernels.

In West Africa - Burkina Faso in particular, the government has historically attempted to fix a cost price for kernels, contrary to market forces of supply and demand.

In Central Africa generally, and in Cameroon in particular, the state as a rule does not intervene in the shea sector (which is still at a very embryonic stage of development). The women often choose to sell kernels (at about CFA 1 000 per basket of about 20 kg) rather than invest their time and energy in the problem of extraction.

In West Africa, policy support is provided to the [shea] sector by determining minimum prices for the sale of kernels. This policy support does not exist in Central Africa.

Traditional extraction of shea butter

Following the collection of fruits and the processing and drying of shea kernels, rural women proceed to the extraction of shea butter. We have already identified mainly two constraints: the arduous nature and duration of labor required by traditional processing methods, and the relatively poor economic returns in remuneration for this work. The producing women sell their production on rural markets at the rate of CFA 500 per liter of shea butter. For a season, a woman markets on average about 40 bottles, which represents a total income of CFA 20 000.

Improved artisanal processing technologies

In response to the technical constraints discussed above, technologies have been developed to improve the extraction of shea butter. In Cameroon, a technology package has been introduced which consists of a dryer and a press, aimed essentially at reducing

the labor inputs required in the extraction of the butter, thus assisting women to obtain a supplementary income through increased production.

The current technology package requires an investment of CFA 1 500 000 for the acquisition of the dryer and the press, redeemable over 10 years. The cost of the investment in equipment is relatively reasonable, and interested farmers may organize themselves into community-based organizations in order to invest collectively in this equipment.

The adoption of improved technologies may have significant economic effects, including:

- Amelioration of the most arduous aspects of extraction;
- Reduction of the time and labor inputs required of the producers;
- Increased financial returns to producers, and
- Increase in total productivity.

In western Africa and in Burkina Faso in particular, artisanal production of shea butter accounts for about 80 percent in the total production of shea butter. In Central Africa this figure currently stands at 100 percent.

Industrial extraction

Industrial processing of shea products should constitute a significant sub-sector, but this has not yet been realized. The shea sector is well developed in West Africa, as exemplified by the Compagnie Industrielle du Textile et du Coton (SITEC) and the Société de Fabrication Industrielle Barro (SOFIB) in Burkina Faso. In Central Africa, however, potentialities exist but are not exploited; the development of the shea resource has yet to begin.

In Central Africa, companies such as the Société de Développement du Coton (SODECOTON) in Cameroun, and the Cotonnière Tchadienne (COTONTCHAD) in Chad – both in areas of strong potential to the shea sector - do not integrate the shea into their activities. This neglect of the resource by existing industries simply could not happen in West Africa. If, for instance, SODECOTON (which produced 113 258 tons of cotton-seed in 1990; 196 239 in 1999) were to devote only 20 percent of their production to sheanut, this would find a ready market, given the national and international demand for shea butter and shea-based products.

Speaking of which, though processing of shea butter into formulated finished products is not common in Africa, interesting examples of such enterprises exist across the region, including PHYCOS in Burkina Faso, and the laboratory of the Wam's group in Cameroon.

The economic potential of the shea tree is certainly a reality. Governments of the producing countries should develop policy and establish set up plans for developing the shea resource, and the structural differentiation of the shea sector. In Nigeria, the largest shea producing country according to published statistics (384 000 tons of sheanut in 1996 according to FAOSTAT) organizations are set up to support prices and guarantee a quality minimum.

In the Burkina Faso (70 000 tons of sheanut produced in 1996) the government established a National Shea Project (Projet National Karité or PNK) which aims to intensify the production and commercialization of shea products in order to enhance the economic position of rural women. Benin (10 000 to 15 000 tons harvested per year) places strong emphasis on the shea resource in order to attract foreign investment, as a sector with "great potential". Meanwhile, in Central Africa, everything remains to be done...

The distribution of shea butter

The distribution of shea butter in urban centers is done mainly through perfume shops for use in cosmetic applications. Two actors intervene in the distribution: the wholesalers and the retail dealers. The economic analysis of the sector indicates that the average profit margins are respectively FCFA 300 and 400 per kg. We note that the further the product moves from the producer, the profit margin increases, but the weak margin to the wholesaler is compensated by the volume of goods which he handles (Perez *and al.*, 1999).

V. PERSPECTIVES FOR THE FUTURE OF THE SHEA SECTOR

It has been demonstrated that as shea butter becomes more common as an ingredient in the manufacture of different finished products (lipsticks, toothpaste, chocolate) demand is steadily growing for industrial consumption of shea butter in nutritional, cosmetic and pharmaceutical applications.

One notes that the shea butter produced in Africa has great difficulty in meeting the product quality criteria of the international marketplace. To benefit from the recent popularity of the product, the following four basic issues should be addressed:

Improvement of product quality

One of the weaknesses of the shea butter is the variability of its physio-chemical properties, the smell and the strong color. For shea to maintain an added value in comparison to the raw material (kernels), it will be necessary to improve the quality of the product. This done, product quality standards may be established.

Development interventions in the shea sector

The implementation of project activities with a focus on the shea sector, at the national level, can include technical training in techniques of improved processing and product packaging. Such project interventions should define an overall policy for the shea sector: product price and quality, improved technologies, producer organization, etc.

Factors of production should be better understood

Studies should be implemented to better understand the factors which determine productivity. Indeed, the annual yield is not at all consistent from year to year; the yield varies considerably according to the quality of the annual harvest, from 10 to 20

kilograms of fruits per tree, that is 2 in 4 kilograms of dry marketed kernels (Aoulou, 1998).

Establishment of a framework of dialogue

The implementation of the national frameworks for dialogue could result in the creation of a sub-regional committee of the shea sector. The sub-regional committee would harmonize the prices to the producers, establish national and sub-regional quality standards, establish common front to defend the interests of the shea sector, and facilitate the exchange of market information at the national, sub-regional and international levels.

VI. CONCLUSION

- The physio-chemical properties of shea butter vary mainly according to the origin of kernels and the extraction process: density (0,91-0,98), melting point (35-40), iodine value (50-80), unsaponifiable content (2-17%).
- The moisture content most favorable to the storage of sheanut is 8-12 percent / 0.3-0.6.
- The processing of shea butter is undertaken at three levels: traditional, improved artisanal, and industrial. To have an impact in terms of benefits to rural women, efforts to reduce the arduous nature of processing and to enhance shea-based livelihoods should be focused at the artisanal production level.

VII. THANKS

The authors thank the United Nations the Food and the Agriculture Organization (FAO) and the Common Fund for Commodities (CFC) for their support, which facilitated the presentation of this work. Thanks also go to the l'AIRE-developpement (Paris, France) and to the Agence Universitaire de la Francophonie (Québec, Canada) for their support to projects which have contributed to development of the shea sector in Cameroon.

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Industrial level uses and quality control for international commerce of shea products

Lars Laurssen, Aarhus Oliefabrik

SHEA PRODUCTS IN CHOCOLATE:

Chocolate industry:

- Mars
- Nestle
- Cadbury
- Barry callebaut
- Ferrero
- Kraft foods

Definition of chocolate:

- Cocoa mass + cocoa butter + sugar

Chocolate products:

CBE - COCOA BUTTER EQUIVALENT

CBI - COCOA BUTTER IMPROVERS

- Both products are based on shea-and illipebutter and palm oil.

5 percent rule of CBE/CBI in chocolate

- The legislation of most countries allows the use of up to 5 percent CBE/CBI in chocolate.

Why use CBE and CBI:

- To weigh up the natural differences in cocoa butter from different countries and crops.
- A series of advantages in the physical properties.
- Cost effective production.

CBE features:

- CBE can be used as a direct substitute for cocoa butter.
- CBE has the ability to delay the onset of bloom in chocolate.
- Less expensive than cocoa butter.

CBI features:

- CBI has the ability to avoid softness in milk chocolate.
- CBI gives chocolate an increased solid fat content giving chocolate better storage stability, particularly in hot climates.

SHEA PRODUCTS IN PHARMACEUTICALS:**Shea nature:**

- Newly designed product based on shea
- Cholesterol reducing effect

In use as:

- A dietary supplement
- An ingredient in functional food

BSP PHARMA A/S:

- Joint venture in the development of new products for the treatment of rheumatism and eczema based on shea oil

Shea products in cosmetics:

Aarhus olie oleochemicals offers a wide range of products based on shea oil for the cosmetic industry in use of:

- Milks and lotion
- Lipstick and lip care sticks
- Deosticks and hair-and body shampoo ect.

Standard quality issues:

- Oil content
- FFA – free fatty acid content
- Moisture content
- Foreign matters

Oil content:

- Fresh/new and well dried nuts gives higher oil content and thus higher quality.
- Old and damaged nuts give more oxidized oil, thus less stability in the oil.
- Fractionated oil gives 50 percent stearin and 50 percent olein.

FFA – Free fatty acid content:

- Fresh/new and well dried nuts give lowest FFA and thus higher quality.
- Ffa has to be taken out of the oil by refining the oil.
- During this process some of the oil will also be lost.

Moisture content:

- High moisture content – high price (you buy water and not oil).
- High moisture creates fungus and damage the nut.

Foreign matters:

- Dust, stones, iron bars, soil, metal things, plastic bags, wood stickers, coins, jewellery. Etc.
- Creates huge problems for the production line in a modern factory.

To reach the best quality of shea, the shea nuts must be:

- New/fresh crop
- Well dried
- Well stored
- Well cleaned

Equitable structuring of the shea sector: To target the most promising markets

Sylvain Matte and Félicité Traoré, CECI

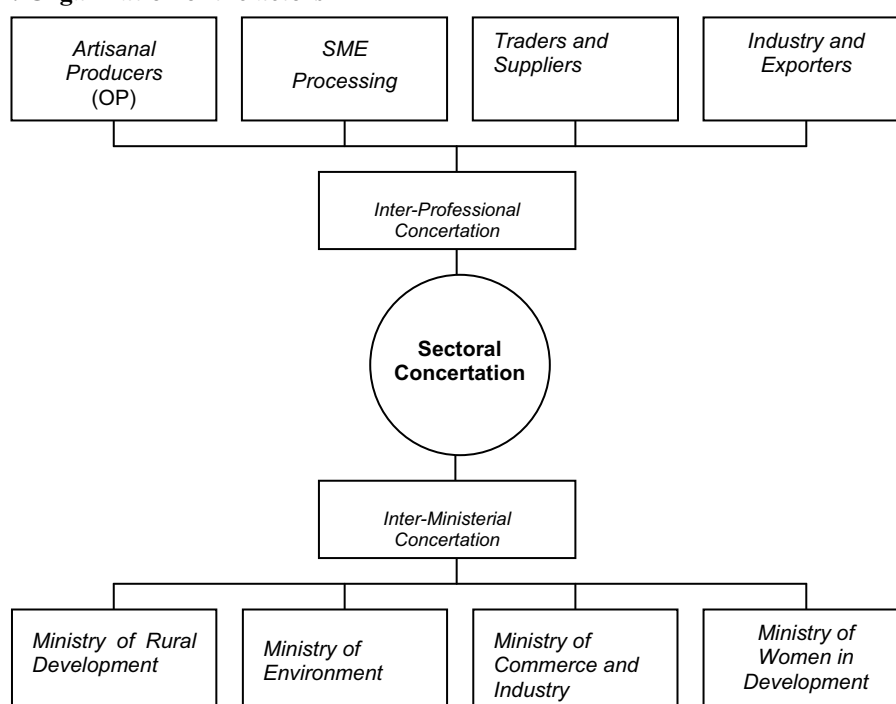
CECI is a Canadian NGO whose mission is to fight against poverty and exclusion through the reinforcement of the capacities of the local stakeholders in development. In the economic sector, CECI has developed an approach to development of the agro-alimentary sectors (*filières*), based on the principles of enhanced responsibility, dialogue and producer equity. It is imperative to put the stakeholders at the heart of the approach, and to support the development of their professional capacities to respond more fully to opportunities which they are offered.

Organization of the shea sector stakeholders

It is imperative to support the installation of stakeholder networks and fora for professional exchange (including gatherers and processors, small and medium-sized processing enterprises, industrialists and exporters, and other suppliers of services). This can enable stakeholders to exchange information on the constraints and the solutions within their reach, and for which they may adopt joint positions for the defense of common interests. The members of these various professional networks become delegates within a framework of inter-professional dialogue, which includes all the economic stakeholders. The ministries concerned with the shea sector are also supported in the installation of a framework of interdepartmental dialogue, in order to put forward a joint position for the development of government policy. A national framework of dialogue of promotion of the sector is thus established, in order to support exchanges between the economic stakeholders and governmental institutions.

Figure 1 illustrates the organizational framework proposed by CECI to place the stakeholders at the heart of the approach to structuring of the sector.

Figure 1: Organization of the actors



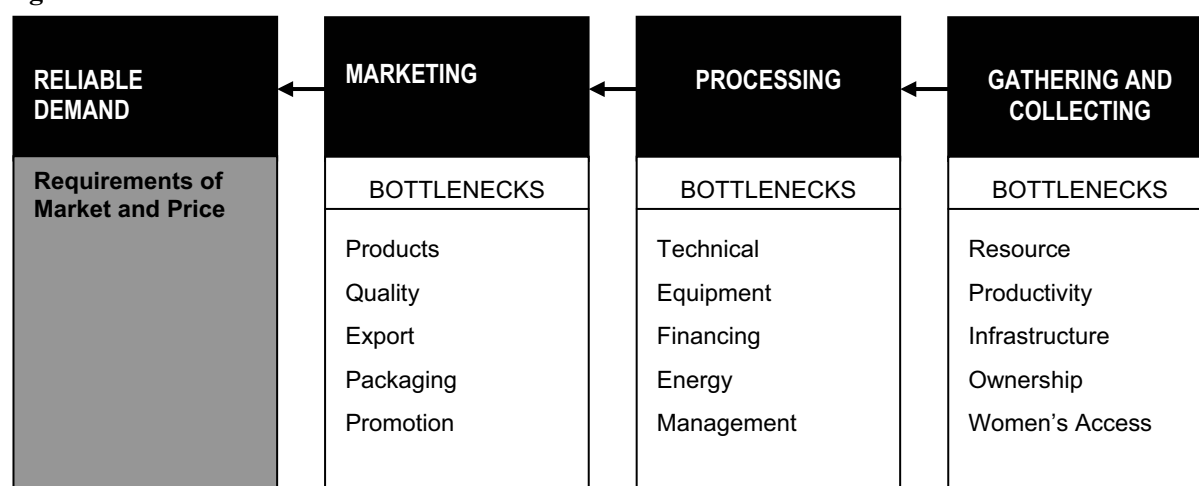
Equitable structuring and professionalization

The step of structuring of the *filière* is based on the solvent demand - and thus on the more promising markets. It will be imperative in the short-term to support stakeholders in terms of market information and analysis, so that all have a good knowledge of the requirements (quality, quantity, products, delivery periods) and product pricing in respect to the various potential niches. In the medium term, it will be imperative to analyze the various bottlenecks which make it difficult (if not impossible) to meet these requirements, or which increase production costs to levels which make the products non-competitive. Many such bottlenecks have been identified at all the levels by the stakeholders, with the facilitation of experts contracted by CECI, with the goal of reviving the *filière* **for the primary benefit of the producers**, beginning with a clear understanding of current market conditions. The bottlenecks identified address all aspects of the shea resource, including gathering and collection of fruit, processing and marketing, as well as the productivity and management of the resource itself.

Figure 2 illustrates hereafter examples of bottlenecks identified by the stakeholders at progressive stages along the supply chain

A list of the principal bottlenecks identified in Burkina Faso is appended to this presentation.

Figure 2: Market structure on the basis of solvent demand

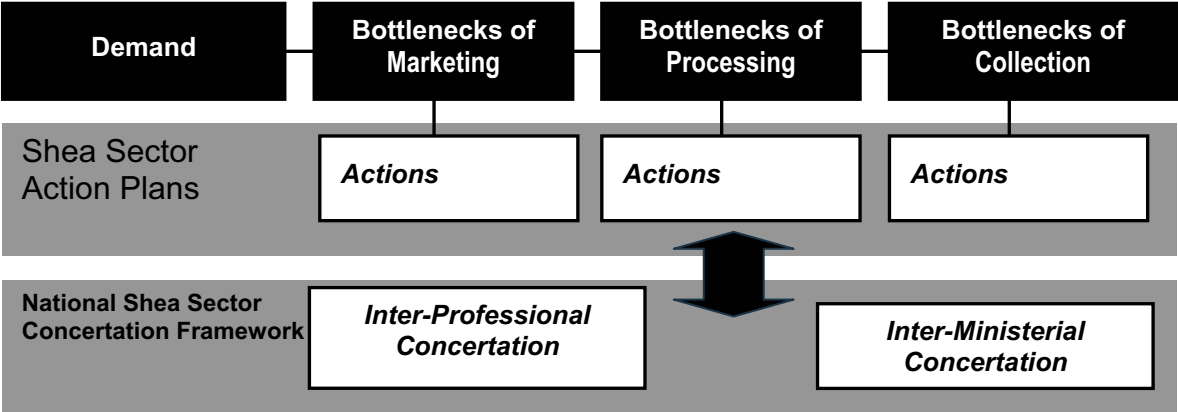


Following this analysis, the practitioners are equipped with a national action plan, which enables prioritization of interventions according to the interests of the various stakeholder groups concerned, both private and public. The action plan must be borne by the framework of national dialogue (see figure 3). The approach should be from a 'bottom-up' perspective; it is important that each stakeholder category is equipped with a specific plan of action. The pooling of the stakeholder group action plans leads to the elaboration of the national action plan, which will express the priority choices agreed by the total ensemble of the stakeholders. For example, the question of quality is a common concern, for which actions must be carried out by all the stakeholder categories. It would be useless for producing women at the source to produce a butter of quality if, thereafter, the available packaging and conditions of transport conditions are not adequate to preserve product quality. Finally, the stakeholders monitor and evaluate the implementation of the

action plan, with the support of technical and financial partners. The interventions carried out by CECI aim at reinforcing the capacities of all the stakeholders of the shea sector.

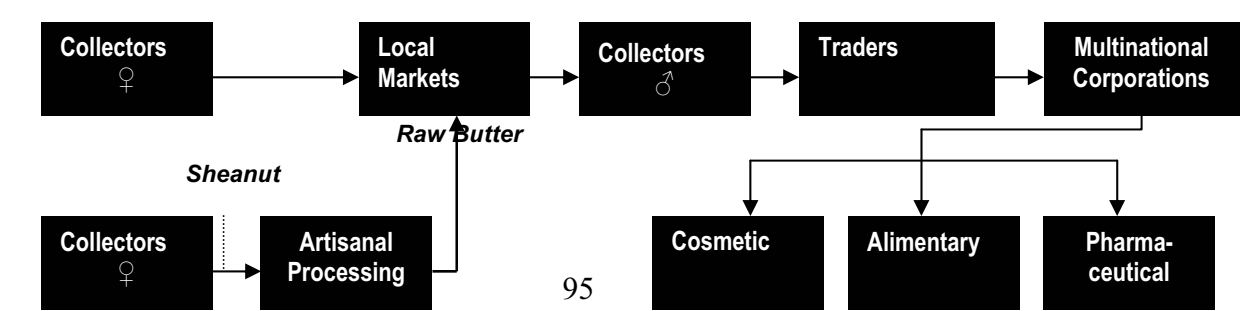
The shea tree is one of few specifically African products. For this reason, we believe that this product should receive special attention from a broader consensus of stakeholders from across the continent, so that they may plan interventions together and act in concert for the promotion of the product on a global scale. Research and the development at all levels will also result in stakeholders becoming better coordinated at the regional level, for example regarding the definition of standards and quality control marks.

Figure 3: Action plans carried out by the stakeholders



Following the disappearance of the national fund for price stabilization in Burkina Faso, the shea *filière* was almost completely destructured. This generated a downward spiral of prices and quality, which led to a significant decrease in production and exports. When CECI began its work with the *filière* about 1985, the market was characterized predominantly by sale of kernels by the women within networks of collectors and tradesmen in bond to the multinationals working in the sector of the oilseeds. The market was opaque and there was very little information available on prices. The collectors, and in certain cases the artisanal processors, sold their product at nonremunerative prices at the time, considering the level of effort involved in primary processing. The exported products (primarily kernels), were processed by the multinationals in Europe and were sold on three principal markets throughout the world which are, in order of importance: the alimentary sub-sector, the cosmetic and, to a lesser extent, the pharmaceutical sector (see figure 4). Quality standards were not being met, and the buyers were not thus not able to offer better prices to the producers. It was on this basis that it CECI launched its venture to deal with the principal bottlenecks: product quality, market information, and organization of the producers, with the objective of increasing the local value added by increasing production and marketing of shea butter to serve the most remunerative markets.

Figure 4: Initial conditions of the shea *filière*



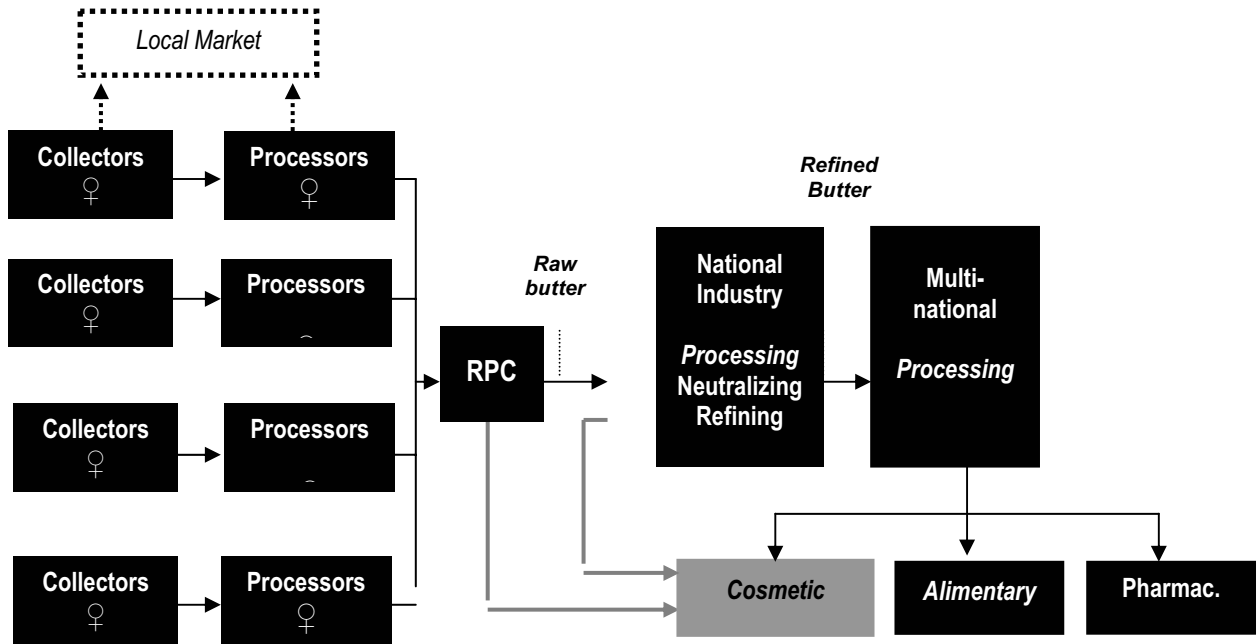
Although CECI's interventions have involved participation of all shea stakeholders, a detailed attention was given to the reinforcement capacities women and their organizations. The shea *filière* (sector) is one in which women are particularly well-represented, and from which many draw their primary incomes. In order to improve and develop the shea sector, it is essential that the women can profit directly from the economic repercussions of the development of the *filière*, by controlling the techniques of production, by the adoption of simple methodologies for product quality control, and through enhanced strategies for product marketing. With this intent, studies on the best techniques of collection and processing were undertaken, which led to the elaboration and diffusion of training modules which have reached thousands of producers to date.

Product quality having been improved by development of technical controls, CECI has facilitated establishment of a network of producer organizations for purposes of production and marketing (*réseau des organisations aux fins de production et de commercialisation*, or RPC). Initially, producer groups were put in contact with national extraction industries active on the international market. Some of these companies have capacities of neutralization and of refining which give an added value to the butter produced by the women before which it could not be exported. In order to allow the women and the other operators to have free access to market information:

- a series of measurements were installed;
- a system for collection of price data on local markets, and of diffusion of market information by radio in the zones of production;
- direct linkage of the producer organizations with the customers;
- participation in sub-regional and international trade fairs, installation of a web site allowing commercial intermediation.

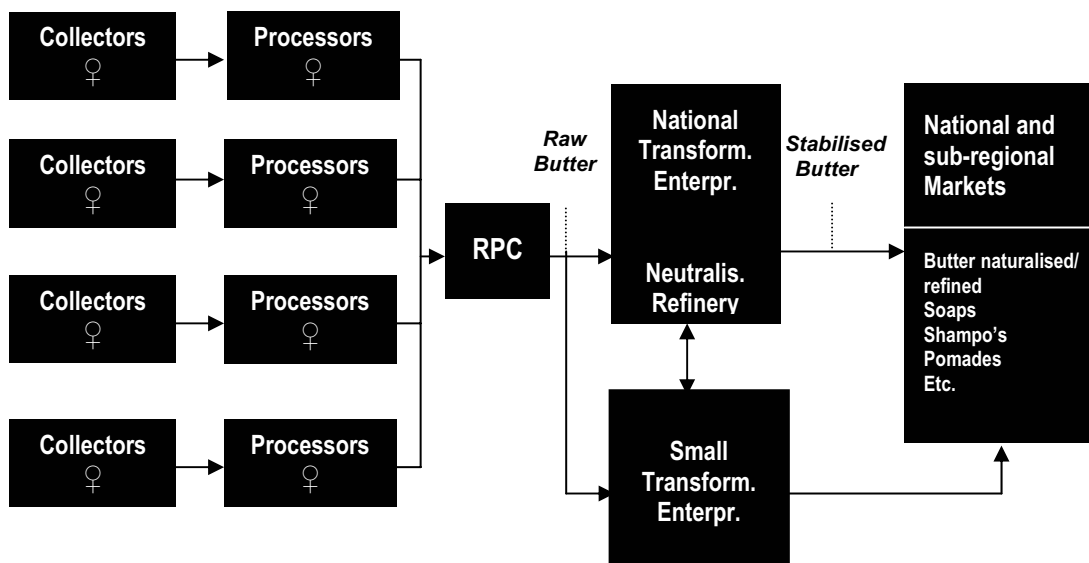
The combination of these mechanisms has made it possible for the producers of Burkina Faso to better publicize and promote their products, to reinforce recognition among producers of the importance of product quality, and to identify promising market niches. Being able to fulfill the requirements of quality and quantity, certain producer organizations could sell their butter directly to European cosmetic manufacturers, shortening the supply chain and thus leading to a direct improvement of the prices obtained by the women. In addition to the reinforcement of the technical capabilities, the capacities of producer organizations were also reinforced in aspects of management, negotiation and defense of their interests. Producer groups were also supported through decentralized financial service providers and commercial banks in order to obtain credit for marketing campaigns and filling commercial orders.

Figure 5: The Export Market



The development of the shea *filère* in Burkina Faso has not been directed solely towards the export market, but also towards the local, national and sub-regional markets. Small production units belonging to women's groups and small enterprises processing butter into finished products were supported in terms of product development and improvement of the techniques of production and marketing. Thus one finds on the Burkinabe national market many local products (soaps, detergents, shampoos, pomades, balms) containing shea butter. These products have penetrated the sub-regional market. Still some important challenges remain, particularly in terms of promotion and the circulation of finished products of Burkinabe manufacture, but the prospects are very encouraging.

Figure 6: National and sub-regional market



Addendum: Technical and Structural Issues to Address

I. Gathering and collection

1. Lack of comprehension of the factors pertaining to growth and the regeneration of the trees (and the issue of ageing of the parklands especially).
2. Absence of statistics on the national park, the production/marketing (rate of unknown collection and unreliable sales statistics).
3. Disparate, little diffused and underexploited scientific and technical research (on the tree, pulp, nut, kernel, residues, new product applications, parasites, the phenomenon of production irregularities, the regeneration of the parkland, potentials for pollination, irrigation, utilization of fertilizer and aspects of organic production/certification).
4. Abusive cutting of the trees, lack of protection of tree (existing legislation not enforced) and access to resources becoming limited for more and more women.
5. Poor quality of kernels due to the late collection and treatment of the nuts (coincidence of the planting period and of that of collection; inappropriate processing techniques, especially according to the needs for the market; gathering of the unripe fruits).
6. Lack of appropriate infrastructures for storage of the kernels.

Primary Processing

7. Poor level of organization of the primary producers and problems of operation involved in the types of leadership within the organizations (maladjustment of the current forms of organization "groupings", organizational commitment scarce or non-existent as, unequal sharing of profits, minimal circulation of information, general inequity; benefits to the poorest not clear, etc.).
8. Low technological level for extraction of shea butter (arduousness of manual kneading, whereas the performance of presses developed to date has been insufficient; difficult access to the equipment, packaging, storage facilities for shea kernels and butter, means of transport).
9. Inconsistent quality of the raw butter produced by women by the traditional method of kneading with water (attachment to the traditional practices of production of butter and minimal adoption of currently developed technologies).
10. Practical utilization of the residue as fuel not adopted (whereas that can contribute to a better output of activity and also contribute to protection of the environment).
11. Significant illiteracy among the producers.
12. Difficult to access rural credit facilities.

Secondary Processing

13. Weak local transformation of butter into products with added value (Lack of knowledge of the products with added value which can be manufactured with locally produced shea butter, to substitute for expensive imports) and development of the cosmetic niche.
14. Difficult access to powerful technologies for shea butter processing (sometimes even ignorance of their existence and problems of high cost).

15. Low capacity of the organizations of women in term of control of the techniques and access to technologies of reprocessing of raw butter so as to obtain a neutralized or refined shea butter.
16. Weak competitiveness of finished products containing shea butter (like the toilet soap, for example), because cost of the factors of production. Imported ingredients such as dyes, perfume and packaging materials are exorbitantly priced (where available) in a land-locked country like Burkina Faso.
17. Lack of technical skills in terms of processing methods (technical support to the agroalimentary and cosmetic sub-sectors, for example).
18. Insufficient technical training in aspects of product quality to allow for production for the manufacture of finished products, in order to accrue significant benefits to producers at the village level (household products, pomade, etc.) or lack of follow-up on the training already undertaken.
19. Difficult to obtain financing for purchase of processing equipment.

Marketing

20. Total lack of organization of the shea market following liberalization (dissolution of the price stabilization fund).
21. Absence of strong commercial networks, especially to facilitate solidarity between producers; lack of entry points and common policies (marketing syndicate); weak presence of women on the level of marketing (insufficiency of training, expertise, leadership, etc.).
22. Lack of a coherent system of product classification and weakness of price differentials according to product quality.
23. Ignorance of opportunities, customer requirements, the significance of market indicators, the prices of shea butter and competitive products, and insufficient access to commercial information (men – women, or more women?).
24. Weak prospecting and exploitation of the local, sub-regional and market international levels.
25. Export activity characterized by sale of sheanut, to the detriment of shea butter market (resulting in loss of added value and employment in processing and related industries).
26. Low producer capacity for negotiation (non-existent label and problematic "Burkina image", weak promotion of the products, insufficient capacities to ensure the marketing and the sale of the products).
27. Ignorance of the production costs by the producing ones and not recognition of the real costs of cost of the products (cost which develop the working time of the women) by customers.
28. Difficulty to develop suitable packaging and presentation.
29. Difficulty of producer organizations filling substantial orders adequately, according to required quality standards and within stated completion periods.
30. High costs of transport because of geographical factors.
31. Presence of a significant number of intermediaries between the primary producers and the customers, adding value at each intermediary stage.
32. Scant opportunities for commercial financing, due to loss of credibility of the principal operators with respect to the banks.

Building New Markets for Shea Products: Perspectives from Eastern Africa

Eliot Masters⁶

ABSTRACT

Though the traditional market chain for shea products is very well established, development of the eastern African shea tree *Vitellaria paradoxa* subspecies *nilotica* as a nutritional and economic resource only began in northern Uganda in 1992. Under the Shea Project for Local Conservation and Development (The Shea Project), improved technologies for shea processing have been developed and adopted by rural processors across the eastern African sub-region, and new, high-value market niches have been identified for high-quality shea butter.

Producers in Uganda and Sudan have developed community-based production units, and have begun to work together to solve technical problems and to meet market opportunities. There are important differences between Eastern and Central Africa and West Africa in terms of both the composition of shea butter, market conditions and product value; technical and commercial solutions developed in Eastern Africa may not be suited to West African conditions, and vice versa. Nevertheless, the most pertinent issues of shea development are consistent across Africa, and the potentials for collective regional action to develop workable and sustainable technical solutions are very great.

BACKGROUND

The eastern African shea tree *Vitellaria paradoxa* subspecies *nilotica* extends across much of southern Sudan into Ethiopia, and south across much of northern Uganda. In 1990 the Ugandan NGO COVOL began to assess the potentials of the shea resource for community-based rural economic development.

The Shea Project for Local Conservation and Development (The Shea Project) began in 1992, starting with development of improved processing technologies and a revolving credit fund for traditional producers. The project has since begun to address marketing requirements of rural processors, women's producer groups and marketing associations.

SHEA PRODUCTION AND MARKETING IN EASTERN AFRICA

Shea nut is obtained from fruit collected from the ground under accessible trees during the annual harvest. Most shea fruit is collected by women and by children, who appreciate the sweet and nutritious fruit as an important source of energy. The shea harvest coincides with the onset of the long rains and the annual 'hungry season,' when stored food runs out, and the harvest is not yet ready, but labor is needed in cultivation.

Shea fruit is rich in vitamins and even protein, estimated at 10% of the dry weight of the pulp. Though some shea fruit is preserved as yao adanya (pounded, molded into discs and

⁶ Coordinator, The Shea Project, COVOL Uganda, www.thesheaproject.org

dried), this process is currently done only by a few elderly men, and is only rarely sold these days.

When the Shea Project began in 1992, it was widely reported (and observed) that significant amounts of sheanut went unharvested and were wasted on the ground. A decade later, shea products seem to have obtained a higher value to the producers, and harvest is now said to be more extensive, if not complete. Competition for harvest of fruit from accessible trees is said to be considerable.

As a function of higher product value, regeneration of the shea tree (while not served by more thorough collection) is also observed to have increased, mainly by protection of shea seedlings on cultivated land. An increase in regeneration has been documented according to a size-class analysis of plant species biodiversity on a set of fixed plots throughout the project area.

Collected nuts may be sold immediately on local markets, dried and sold (on rural or urban markets), dried and processed, stored and sold, or stored and processed.

In recognition of the (partly-seasonal) variability in moisture content, shea kernel is sold by the 0.5 liter cup (known as a ‘cup’), the standard volume for a given market price. There are about 240 such cups in a 100-kg storage sack. In Sudan and Ethiopia, nuts are also measured by volume (a 20-liter tin), but sheanut is rarely sold. Shea butter is the foremost food oil in the production areas; about half of all household shea butter production is consumed in the house, and half is sold locally or in town. Shea butter in eastern Africa is always sold as a liquid, in a bottle of a standard size (usually 50ml, 100ml, 250 and 700 ml, a standard size known as a ‘tree top’ in Uganda, *gizaza* in Sudan). The smallest measure by which sheabutter is sold is a small capful of about 10 ml – making shea butter accessible to the poor.

The hub of the shea sector in Uganda is the northern town of Lira, where several rural supply chains of sheanut and shea butter converge from a radius of over 100km. Shea products are traded at weekly markets in the rural areas, which increase in both supply and price with proximity to major roads, and thus urban areas.

While prices for shea butter are known to be higher in other towns (notably Gulu), supply is only regular (and extensive) in Lira town. Though traders will occasionally take shea butter down to Kampala (350 km. to the South), shea butter is not yet a well-known product outside of the production areas in northern Uganda.

The quality of shea butter is highly variable, depending on the care and skill of the producer. The appearance of traditionally-processed shea butter ranges from a completely, clear, golden product to a greyish oil heavily contaminated with ash. The storage of shea butter greatly affects product quality as well, as contamination by even a very small amount of water will very rapidly lead to oxidative rancidity of the oil.

SHEA PRODUCTS MARKET STUDY

In 1995, COVOL began monitoring price and supply of shea nut and shea butter at 16 markets across northern Uganda, including data the following parameters for each individual respondent:

- 1) Seller name (gender)
- 2) Sheanut or shea butter
- 3) Origin of product
- 4) Product collected (at harvest) or bought
- 5) Quantity for sale
- 6) Price per unit
- 7) Estimated volume sold

Data from over 4500 spot market interviews from 1995 through 2000 has been compiled, and is currently being analyzed by COVOL and the University of Freiburg under the INCO Parklands Project.

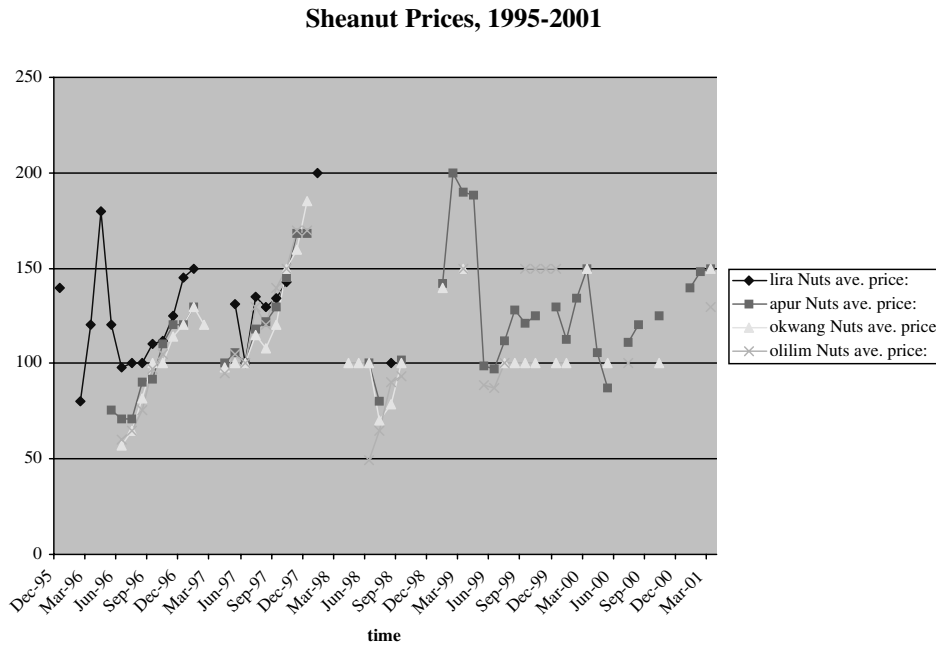
Market monitoring based on the same format has been conducted in southern Sudan, but market information is considered highly sensitive there, given the popularity of relief food oils which are theoretically distributed free of charge to those in need. In Ethiopia, the shea resource has not been fully assessed, but ground-work has begun in preparation for introduction of improved processing technologies by COVOL later this year.

The information collected under COVOL's market monitoring survey gives an accurate picture of annual (seasonal) price fluctuations, and illustrates how the pattern may differ from year to year, based on the strength of the annual harvest. The initial results of COVOL's market monitoring study are summarized in this paper.

Initial Observations

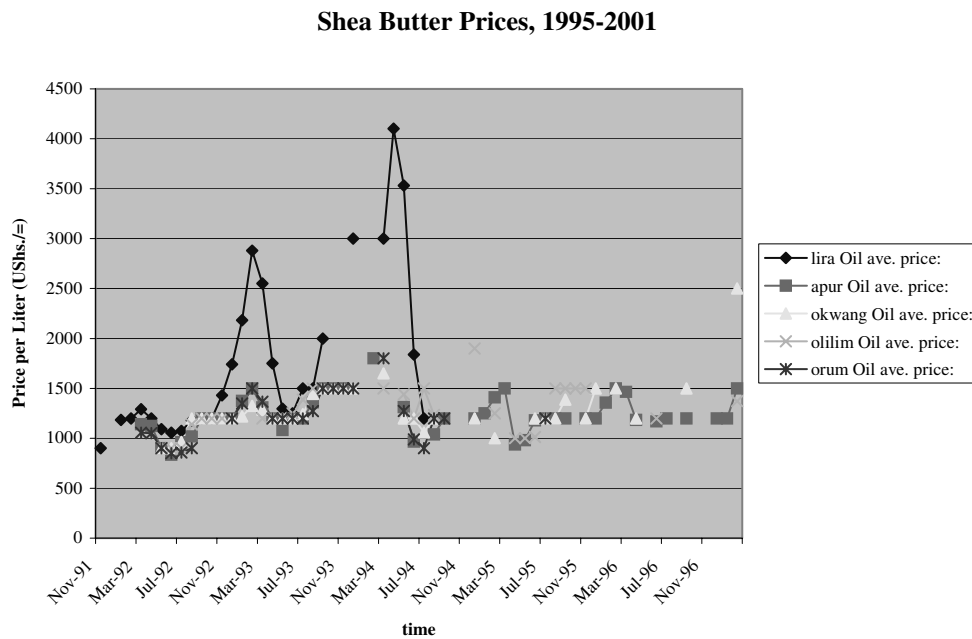
1. The market monitoring survey tracks price fluctuations with annual highs and lows a function of supply, based on seasonable availability as well as the magnitude of the annual harvest. According to comparable price estimates from Central and West Africa, the annual price cycle is fairly consistent across the shea zone.

Figure 1: Sheanut Price Cycle on Markets, 1995-2000



- Interestingly, however, the actual prices for traditionally-processed shea products in the local markets of Eastern Africa - Uganda, Sudan and Ethiopia – have proven to be roughly twice as high as in West Africa, where prices are largely determined by the exigencies of the international export market. In eastern Africa, by contrast, the prices for shea products have been exclusively linked to the 'real' value as negotiated and determined by solely by local producers and consumers. Prices from Central Africa are more comparable to eastern than to West Africa.

Figure 2: Shea Butter Price Cycle on Ugandan Markets, 1995-2000



3. In general, the traditional shea market is well-developed, with specialist producers and traders at many levels, from rural collectors of sheanut to urban processors who buy their nuts in town markets.
4. Producer strategies are quite complex, and are determined in direct response to market conditions. Though men and women are involved in sale of sheanut, women make up over half of rural vendors and about 2/3 of the vendors in Lira town. Men seem to be better market strategists; they are better represented at times of the highest market price, while women sell in greater numbers during times of greatest supply (and lowest price).

Shea butter, however, is nearly always sold by women; 100 percent of urban shea butter vendors are women, as is over 95 percent of rural shea butter vendors. Women are much more widely represented as shea butter vendors, particularly in rural markets – primarily due to their role as shea processors. Women appear to be better strategists at marketing shea butter than sheanut, and are better represented during the mid-range period and during the annual price peaks. It should be noted that while women seem to benefit most from sales of shea products (particularly shea butter, made by women's labor); women's revenues are usually shared by the household.

5. Despite the higher prices for both sheanut and shea butter as compared to West Africa, profitability of traditional methods of shea butter extraction remains quite low. By comparing the value of one liter of shea butter to the value of the sheanut from which it is produced (at an average extraction rate of 25%), we find that profitability ranges very widely according to market conditions, with negative returns not uncommon.
6. In Uganda, prices for shea butter vary by a factor of about 1.8 on rural markets, but 3.3 on urban markets, while sheanut prices, by a factor of only 2.8 on rural markets, and only 2.5 in Lira town. Strategies for maximizing profitability will thus differ significantly between rural and urban markets.
7. Despite this cycle of considerable price variation throughout the year, with volume factored in, market prices are seen to be 'semi-stabilized' over time, at mid-points of Ush.100/= per cup of nuts (about \$ 0.12 per kg) and Ushs.1200/= per liter of oil (about \$ 0.75 per kg) at Lira market. By market volume, about 43 percent of sheanuts and 53 percent of shea butter are sold at these predominant prices. The profitability of shea production according to these 'averages' is about \$ 0.23 per liter, or less than US\$ 1.00 per day, and does not factor inputs, including fuelwood, water and women's labor.
8. Despite higher product prices as compared to the largely export-driven shea markets of West Africa, profitability to eastern African producers for traditionally-processed shea butter is – simply put - too low, given the great cultural, nutritional and economic importance of shea products.

THE SHEA PROJECT: IMPROVED PROCESSING AND MARKETING

The Shea Project for Local Conservation and Development (The Shea Project) began in 1992, starting with development of improved processing technologies and a revolving credit fund for traditional producers.

From 1992-97, COVOL developed a simple improved technology package for rural processing of high-quality shea butter, with greatly enhanced production capacity and reduced inputs of female labor, fuelwood and water as compared to traditional extraction methods.

Due to the high olein to stearin ratio of the *nilotica* subspecies, the COVOL technology package works very effectively, and relatively efficiently. Priced affordably, the press and grinder system has become quite popular among local producer groups in Uganda and Sudan, and interest in Ethiopia is building. In Central Africa, shea butter is also higher in olein than the West African product, and a shea press design very similar to the COVOL design is used in both Chad and Central African Republic.

Since 1997, COVOL has extended production activities based on the Shea Project production and management model to Sudan, including a processing equipment package and technical and management training to build capable worker-owned rural production enterprises across southern Sudan. COVOL has also developed technical linkages to Gambella Regional Federal State in Ethiopia, where the tree has only recently been identified as a resource.

BUILDING NEW MARKETS FOR EASTERN AFRICA

Since the development of COVOL's shea press technology package in 1997, COVOL has worked to build market opportunities for rural producers of improved, high-quality shea butter.

In its marketing activities, COVOL works in direct partnership with the Northern Uganda Shea Processors Association (NUSPA), comprised of rural producer groups of over 2 000 members, mostly women. NUSPA uses the COVOL village-level technology package to produce a high-value shea butter for food and cosmetic applications which does not require further refinement.

By agreement, COVOL purchases the highest quality cold-pressed shea butter from NUSPA at a fixed premium of 200 to 300 percent the common market price for traditionally processed shea butter. Food-grade 'hot-pressed' shea butter extracted from roasted sheanut (which gives a slightly higher yield and can be made from Grade B nuts) is purchased at a premium of 150 to 200 percent the common market price. Unlike traditional prices, the premium to NUSPA does not fluctuate throughout the year; production is done on order according to demand.

This premium ensures the highest possible quality standards, and protects traditional processors (as well as the NUSPA producers) from a market 'flooded' with cheap, high quality shea butter. A consistently higher purchase price means a higher-value product, at a premium price which must be passed on through wholesale and retail market levels.

Marketing of shea products from the NUSPA producer groups began with small amounts of shea stearin to the United States, for high-value sales, packaged in jars and sold wholesale to a natural cosmetics company, which distributed product through 10 retail shops in northern California. More recently COVOL has begun to develop products aimed at local, national and regional market niches for Ugandan shea butter.

By contrast, given Sudanese realities, shea butter produced by the Sudanese production groups is marketed primarily as food oil at the local and national level. Some regional and international market options have also been explored, but these will not be a priority until local food oil needs are first addressed. In this, Sudanese producers are up against the dominant relief paradigm, whereby surplus food oil from Europe and the US is ‘donated’ as relief oil to displaced populations.

For producers in Uganda, Sudan and Ethiopia, COVOL continues to seek niche markets for locally and ethically-produced shea butter for a broad range of high-value end use applications – as food oil, as a skin treatment, sold in bulk, wholesale and retail, in pure form and in cosmetic and pharmaceutical formulations. Diversification of end-use applications and development of a broad range of new, high-value products is crucial to COVOL’s task of increasing returns to the primary producer - raising the value of the living shea tree.

Access to new markets for Ugandan shea-butter has already increased household incomes in northern Uganda dramatically, while simultaneously raising the value of the living shea tree. As more families and communities reap tangible benefits from the living shea tree, local conservation efforts have gained momentum. Shea trees once commonly cut for charcoal are now recognized as an important economic resource for the entire community.

As noted in previous sections, the price of shea-butter fluctuates according to annual and seasonal variability; this price differential is most noticeable between February of a given year (when shea products are most scarce) and June, when they are most abundant.

With improved storage and processing methods developed under the Shea Project, demand for shea products has become more consistent throughout the year. Labor-saving technologies help to solve the problem of seasonal labor ‘bottlenecks’ which currently result in market distortions - thus giving the women who process shea more strategic choices in their processing and marketing.

EXTENSION TRAINING IN PRODUCT QUALITY CONTROL AND BUSINESS DEVELOPMENT

With support from the US-based McKnight Foundation, a comprehensive training curriculum was developed for improved shea processing in the districts of Lira, Pader (Kitgum), Katakwi, Kotido and Gulu, northern Uganda. A series of comprehensive technical training workshops in improved shea processing methods and technologies were conducted across the project area, with a focus on product quality control.

The notion of grading of sheanuts into four categories of quality (A, B, C and trash) has been an effective means of guaranteeing consistent quality, effectively promoting diffusion of proper storage techniques to secondary and tertiary producers. The rejection by NUSPA of poor-quality sheanut offered to them for sale has also served to reinforce new concepts of sheanut quality.

While it has proven relatively straightforward to train producers in use of the machines, adoption of proper storage techniques takes longer, and other aspects of product quality control are on-going over the long run. For example, diligence in the clarification boiling process is critical to avoid contamination of the product with nut residues.

NUSPA development

NUSPA is a producer's association consisting of a broad consortium of 37 rural community-based organizations women's groups, farming groups, youth groups – totaling over 2 000 members. NUSPA chapters are currently active in the districts of Lira, Pader, Gulu and Katakwi, covering an area of some 16 000 square kilometers across northern Uganda.

At present, NUSPA is registered in the Republic of Uganda as a limited-liability company, based on ownership by all members of all the NUSPA producer groups, and a set of principles including:

- group decision-making at the group, district and national levels;
- minimum 2/3 female representation from member groups;
- member group chairpersons and treasurers must both be female;
- each group undertakes equitable distribution of production income;
- each group undertakes to elect capable, effective, transparent and accountable officers;
- producer group ownership of processing technology.

NUSPA currently maintains four chapters across northern Uganda, in the districts of Lira, Katakwi, Pader (formerly Kitgum) and Gulu. Each NUSPA chapter is composed of delegates from a total of 37 member groups totaling 2 000 farmers.

Protecting resource ownership by rural women

Women form about 70 percent of the membership of the NUSPA member organizations. In light of this fact, and in order to reinforce women's ownership of the shea resource (traditionally the domain of women), the NUSPA Constitution specifies that as each group elects three representatives to the NUSPA Executive, a minimum of two of the three representatives must be women. NUSPA has gone further, with a regulation stating that member group chairpersons must be women.

This system of 'affirmative action' on basis of gender results in a minimum 2/3 female majority of the NUSPA Executive, and has been an effective structural means of protecting women's tenure and ownership of a traditionally female resource.

The quantity of sheanut stored by NUSPA member groups has been increased from 38 500 kg in October 2000 to 54 700 kg in October 2001 – an increase of over 70 percent. The ability of the NUSPA groups to properly store a stock of over 50 metric tons will allow adequate production throughout the year, and will help as a buffer in the event of a poor shea harvest on any given year.

The quality of sheanut stored by NUSPA, and of shea butter produced and sold by NUSPA, has increased significantly. Currently less than 5 percent of NUSPA shea butter purchased is rejected on the basis of impurities, as compared to nearly 25 percent in 1999.

During the past year, over 2 500 kg of shea butter has been purchased from NUSPA member groups, at a price two to three times higher than local market prices for traditionally-processed shea butter. At this premium, returns to the amount of 15 175 000 Uganda Shillings (about \$ 9 000) was paid to NUSPA producers during the 2001.

Rural livelihoods: income to producers from NUSPA shea butter sales

In order to ensure product quality, protect traditional processors, and raise the value of the living shea tree, COVOL established a premium fair-trade purchase price for cold-pressed NUSPA shea butter of \$ 3.50 per kg. This price is more than twice as high as the highest market prices for traditionally-processed shea butter, and nearly four times the local market price for shea butter in West Africa.

In order to document benefits to producers and how these benefits actually impact the producer household, COVOL has conducted 72 case study interviews of improved shea butter producers and marketers who have sold their produce through NUSPA over the past year.

The producers surveyed all indicated that their household standard of living had improved with the income they took in from processing – and with the returns from secondary investments in a wide range of economic activities and rural enterprises.

As COVOL learned from implementation of the Rural Credit Program, which closed with 100 percent repayment in October 2000, the farmers of the project area are very capable of devising a range of highly sophisticated strategies for re-investment. Thus, with careful planning, even a small capital input can ultimately generate significant benefits to the household.

According to an analysis of 72 case studies, producers typically invested 33 percent of their income from production in other rural enterprises, with an average 151 percent profit from these secondary income-generating activities. 10 percent of the respondents started new business enterprises with their income from production.

After business investments, 21 percent of the respondent's income went into livestock and 13 percent into cultivation and food storage; a total of 34 percent income to household food security.

Of the balance, 16 percent of the production revenues went to support education, 7 percent went to savings, and the remaining 10 percent to household expenses and medical care for the producers and their families.

**Figure 3: NUSPA Production Income Use Summary, from case study Data
(n = 72)**

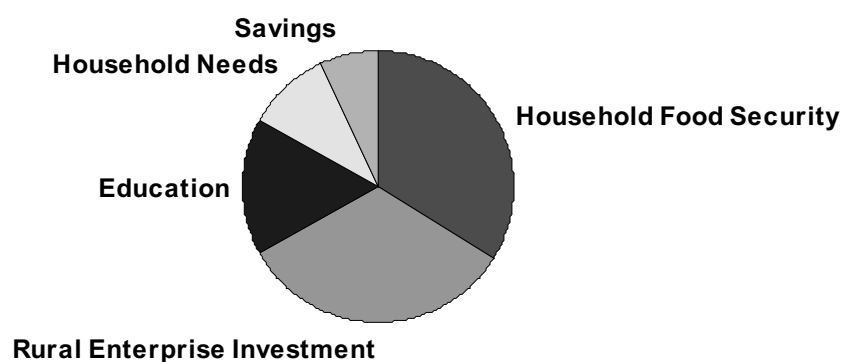


Table 1: NUSPA Production Income, from case study data

(n = 72)

Household Food Security			34%
	Livestock	21%	
	Cultivation & Household Food Storage	13%	
Rural Enterprise Investment			33%
Education			16%
Household			10%
	Clothing, soap, salt, taxes etc.	4%	
	Marriage	3%	
	Housing	2%	
	Medical	1%	
Savings			7%
Total:			100%

Developing NUSPA market access

COVOL will continue to work in close partnership with NUSPA over the next 5 years, to identify new and existing markets for the highest quality NUSPA shea butter, and new shea butter products.

Market access will continue to be broad-based, from the local to the regional and international. NUSPA will progressively take greater responsibility for product quality control, and post-extraction processing into new, value-added shea products for national and regional markets.

As Uganda has no direct port access, the shea butter it producers for export must be of the very highest, targeting the highest-value end-use applications. The limiting factor to accessing international markets for bulk shea butter is competition from widely-available, cheap shea butters from West Africa, cheap because they are produced industrially, or because they are low quality shea butters which have been industrially processed or refined. In addition, these shea butters are naturally harder than shea butter from the *nilotica* subspecies, making them easier to package and handle.

Whereas the low stearin to olein ration of the eastern African shea butter was initially seen as a disadvantage and an obstacle to international market access, the unique characteristics of this softer product have proven to offer an advantage over the long term. The high-quality nilotic shea butter produced by NUSPA is a new product on the world market, and it will require further investment in time and resources in order to educate consumers as to the unique qualities of the NUSPA product.

Because the objectives of NUSPA and Shea Project are predicated on maximum returns to producers, NUSPA shea butter will always be more expensive than conventional shea butters of West African origin. Fortunately, there are consumers and manufacturers who value the social and environmental benefits of the NUSPA production model, in addition to the exceptionally high quality – and unique physical properties – of NUSPA-produced nilotica shea butter.

PRODUCT DEVELOPMENT

In the meantime, COVOL and NUSPA have developed a number of end-use products from NUSPA shea butter, to serve national, regional and international markets. The objective of the Product Development Program of the Shea Project is to build a broad base of market applications for a wide range of high-quality shea butter and its derivatives. Only through diversification of high-value products across market levels – local, national, regional and international – can NUSPA be assured of a stable, sustainable market for their products over time.

In the development of market outlets, the Shea Project / NUSPA principles of producer equity and female ownership serve as a ‘selling point’ – many consumers are very happy to support a constructive process that directly benefits rural African women.

In addition to the fair trade angle, product quality is exceptionally high for a shea-butter produced using natural methods in rural Africa. The quality of the product – as well as

the unique properties of shea butter from the nilotica subspecies – make NUSPA shea butter a unique commodity internationally.

Serving local markets first

NUSPA currently produces, packages and markets within Uganda a cold-pressed and a hot-pressed (roasted) shea butter for cooking and consumption respectively. Both products are packaged in 500 g containers and sold under the Pure Gold label.

Also for the East African market, COVOL and NUSPA have recently begun sales of a scented shea butter for use as a body moisturizer. Sold in a 200 g green plastic jar, the scents used are essential oils of ylang-ylang and frankincense.

To date, Pure Gold and the scented body butter have been marketed in Lira town and through local trade shows (most recently the Uganda National World Food Day celebrations in September 2001), with limited sales in Kampala and Nairobi. Recently traders from Gulu and Kampala have expressed interest in distribution and retail sales of Pure Gold food oils and the scented body butter.

THE NEW SUDAN LULU NETWORK

Since 1997, and with rapidly building momentum since 2000, the Shea Project has become a regional initiative, with adoption of COVOL's improved shea processing technology package by 14 producer groups in Mapel, Wulu, Billing, Agany, Yirol, Atrieu, Kotobi and Kajo Keji.

In 2000, producer groups and support organizations from across southern Sudan came together under an informal working group known as the New Sudan Lulu Network (NSLN), lulu being the Sudanese Arabic word for shea.

To date, COVOL has trained over 100 women producers from New Sudan in improved shea processing and storage methods in both Uganda and Sudan), and has sold a total of 7 grinding units and 19 presses to collaborating support organizations. Though COVOL's involvement in New Sudan has to date been limited and indirect, funded solely through technology training workshops and sales, we recognise that eventually production and marketing issues will ultimately require a regional approach.

NUSPA's contacts with producer groups in Sudan, and their progress during the past few years, have given NUSPA officers and members an enhanced appreciation of their significance as the vanguard of a new regional industry, based on maximum benefits to those that live with the shea tree, across national boundaries.

For their part, the New Sudan Lulu Network has taken inspiration from NUSPA's founding principles, formalised into a mission statement, included below as an addendum to this paper.

DEVELOPING A REGIONAL MODEL OF SHEA PRODUCTION AND MARKETING

Over the past decade, improved production of high-quality shea butter has become a regional economic activity of some significance, with benefits to household livelihoods and nutrition across a wide area of Uganda and Sudan.

Development of shea butter as a resource in Eastern Africa is particularly important given its contrast to the West African economic model of shea commercialisation, which is based primarily on export of low-value sheanut, with added value going to large-scale industrial importers. In eastern Africa, principles of decentralized production, producer equity, and women's ownership of the shea resource should be formalized and reinforced across the Eastern Africa shea zone.

While high-value niche markets for shea butter export will be sought, a primary emphasis on local consumption will be maintained within the eastern African sub-region.

During the coming years, COVOL will continue to lobby other NGOs and potential donors to promote their involvement in shea development where COVOL does not have the capacity to serve directly, to ultimately serve shea producers across the Eastern African shea belt in Uganda, New Sudan and Ethiopia.

Addendum

Mission Statement: The New Sudan Lulu Network (NSLN)

We, the Undersigned shea butter (lulu) producers, having come together at Wulu, New Sudan, from 11-17 November 2001, have resolved to establish a New Sudan Lulu Network, based on the following principles:

1. Producer Equity: Our task is to establish a new industry of improved lulu oil production for New Sudan, based on decentralized, small-scale production enterprises, widely dispersed throughout the lulu belt of New Sudan. Our production units will be based on cooperative principles, characterized by worker-owned and managed enterprises.
2. Women's Ownership: Our production enterprises will be founded on women's primary ownership, in recognition of women's role as traditional custodians of the lulu resource, and primary guardians of household food security.
3. Product Quality: Our lulu-based products will be of consistently and exceptionally high quality, to serve the needs of consumers at the local, national, regional and international market levels.
4. Serving Local Needs First: Our primary emphasis will focus on local markets for food oil and body lotion, with anticipated expansion to regional and external markets once a regular surplus is established.
5. Conservation and Sustainable Resource Management: Our new industry is based on community-driven conservation and sustainable management of lulu trees and woodland, for the future of the lulu resource and our own livelihoods.

International Standards for Raw and Processed Products, Quality Control and Certification System for Exported Products

Enrico Casadei⁷

INTRODUCTION

Shea butter is considered one of the few resources available in rural areas of West African countries, where many food security problems persist. Shea butter provides - and/or could provide - a much-needed source of dietary fat for poor households. Regrettably, its consumption, production and commercialisation have not been given adequate recognition and support and, in many areas, it is being increasingly abandoned - resulting in poorer diets and increased malnutrition.

The promotion of under-exploited foods requires an integrated approach at all stages of the food chain, from initial research to end consumption. The FAO role includes promoting the sustainable economic integration of under-utilized species into local farming systems, conservation of genetic resources, and enhanced productivity through crop breeding and integrated management. Participatory studies at the community level clearly indicate the importance of shea butter for rural households, particularly for women as they are most involved in the processing and utilization of the resource. FAO is also engaged in promoting research on measures to improve production, utilization and preservation of indigenous and traditional foods. The introduction and development of rural food processing technologies, increasing market access for producers at the village, artisanal and industrial levels is also considered an important strategy, as recommended by the resolutions of the International Conference on Nutrition (1992) in order to respond to the dramatic deterioration of the nutritional situation in sub-Saharan Africa. Encouraging appropriate use of local food resources is also an essential component of strategies for nutrition education and communication.

Shea butter does not only represents an important source of energy for local population where the shea tree (*Vitellaria paradoxa*) occurs; this unique product also constitutes an important source of income for rural populations across the African shea belt, an area in which GNP is one of the lowest in the world.

Shea butter is produced on an industrial basis in Benin, Burkina Faso, Mali and Togo, and is exported to industrialized countries. Shea butter has a number of industrial roles, but the vast majority of exported shea kernels (approximately 95%) provide an important raw material for cocoa butter replacers (CBRs), used for manufacturing chocolate and other confectionery. The *Codex Alimentarius* has elaborated a standard for chocolate and chocolate products, which permits the addition of vegetable fat other than cocoa butter up to 5 percent of the finished product. Minor uses include cosmetics and pharmaceuticals. The export market for CBRs is shared between Unilever (UK), Aarhus Oliefabrik (Denmark), Fuji Itoh and Kaneka-Mitsubishi (Japan) and Karlshamns (Sweden).

⁷ Food and Nutrition Division, FAO, Rome, Italy

The instability of supply from a resource base of variable quality - which owes its existence to farmers' tolerance of naturally-occurring trees on their land, rather than a conscious decision to establish them there - does not favor management refinements. However, if producer countries promote effective, locally-driven conservation measures (possibly supplemented by regenerative planting), and interact to accelerate domestication and improvement of the resource, prospects for controlling supply levels and quality (and thereby sustaining a specialty market) would appear to be favorable. Facilitating this task as a co-operative development action at the local or village level would reduce the risk of market domination by a small number of large producers.

In attempting to facilitate linkages between producers and the international market, viable mechanisms should be developed through which commodity producers could bypass several intermediary stages in the trade process, and thus increase the likelihood of receiving a more remunerative return for their products.

THE NEW INTERNATIONAL FOOD TRADE ENVIRONMENT

The Uruguay Round of Multilateral Trade Negotiations was concluded in April 1994 by the signing of the Marrakech Agreement. This gave birth to a number of multilateral trade agreements to which all Members of the World Trade Organization, established in 1995, are committed. These have completely changed the environment of international food trade. Two WTO Agreements are of particular interest from the perspective of food quality and safety, as they introduce a measure of discipline to these areas in international trade. These are the Agreement on Technical Barriers to Trade (TBT Agreement) and the Agreement on Application of Sanitary and Phytosanitary Measures (SPS Agreement).

The TBT Agreement recognizes international standards where they exist. It requires that technical regulations on traditional quality factors, fraudulent practices, packaging, labeling etc. (other than standards covered by the SPS Agreement) imposed by countries will not be more restrictive on imported products than they are on products produced domestically. Technical measures applied should not create unnecessary barriers in international trade, should have a legitimate purpose and the cost of their implementation should be proportional to the purpose of the measure.

The SPS Agreement reaffirms the right of every Member State to adopt or enforce measures necessary to protect human, animal and/or plant life or health, as long as these measures are applied only to the extent necessary, are based on scientific principles, and are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between Member States in which similar conditions prevail, or as a disguised restriction on international trade. The SPS Agreement encourages Member States to base their sanitary and phytosanitary measures on international standards, guidelines and recommendations developed by international organizations, where they exist. These organizations include, for food safety, the Joint FAO/WHO Food Standard Program (*Codex Alimentarius*); for animal health, the *Office International des Epizooties*; and for plant health, the International Plant Protection Convention. Member countries must demonstrate to their trading partners the scientific basis for their SPS measures if these differ from those adopted by the international standard-setting organizations.

CODEX STANDARDS FOR FAT AND OILS

- The *Codex Alimentarius* is the international body responsible for the execution of the Joint FAO/WHO Food Standards Program. Created in 1962 by FAO and WHO the Program is aimed at protecting the health of consumer and facilitating international trade in foods.
- The *Codex Alimentarius* is a collection of international food standards and provisions of an advisory nature, as adopted in the form of codes of practice, guidelines and other recommended measures to assist signatory states in achieving the purpose of the *Codex Alimentarius*. The *Codex Alimentarius* elaborates standards for all principal foods, whether processed, semi-processed or raw, for distribution to the consumer.
- The Codex Committee on Fats and Oils elaborates International Standards and Code of Practice on Vegetable Fats. They are adopted by the *Codex Alimentarius* Commission and are published in Volume 8 on Fats, Oils and Related Products.
- Codex Standard for Edible Fats and Oils not covered by individual standards applies to oils and mixture thereof in a state for human consumption. It includes oils and fats that have been subjected to processes of modification (such as transesterification or hydrogenation) or fractionation.
- This standard applies to shea butter and refers to a semi-solid product that consists of an edible vegetable fat or a blend of edible vegetable oils and fats complying with the provisions of the Codex standard. Basically, the Codex standard includes a section on description on composition, food additives, and maximum level for contaminants, packaging and labeling. The standard recommends that the product be prepared in accordance with appropriate sections of the General Principles of Food Hygiene recommended by the *Codex Alimentarius* Commission. Recommended methods of analysis to control provisions in the standards are also included as a section of the Codex standard.

The Code of practice for storage and transport of edible fats and oils in bulk applies to the handling, storage and transport of all crude or processed edible oils and fats in bulk.

Three types of deterioration can occur in oils and fats during the operations dealt with this Code: oxidation, hydrolysis and contamination. The Code describes the conditions necessary to control the deterioration of fats and oils. The susceptibility of oils and fats to deterioration depends upon a number of factors including the type of oil or fat, whether it is crude, partially or fully refined, and whether impurities are present. These should be considered when storing and transporting the oil. A section on storage and transportation includes a description and characteristics of tanks and pipelines and operations of loading and unloading. Instructions on cleaning, maintenance and other operations related to identification, records and sampling. For shea butter, the range of temperature recommended during storage and bulk shipment is between 38–41° C, and during loading and discharge between 50–55° C.

INSPECTION AND CERTIFICATION OF EXPORTED PRODUCTS

- The annual production of shea nut in West Africa is estimated over 600 000 MT. Most is commercialized locally, used directly by rural households as cooking oil or as butter for the skin and hair. The average of Shea nut export is indicated around 50 000 MTs per year. As mentioned above, a few companies (mostly based in Europe) largely control the import market for shea nut; however, accurate trade statistics are difficult to obtain.
- Quality standards are generally specified by the individual importing companies, and such standards refer generally to free fatty acids ($\leq 6\%$), moisture content ($\leq 7\%$), oil content ($\geq 45\%$) and latex (4–10%). The value of exported sheanut is related to the quality of the product. Importers of shea butter for the cosmetic and pharmaceutical sub-sectors require more elaborate specifications related to the quality of their products.
- Shea producing countries are currently facing problems related to the export of products with added value, due in part to a lack of appropriate technologies and market controls. Most of the African producing countries are isolated, and do not presently cooperate in order to develop increased access to technologies, to develop and enforce standards of product quality control, and to respond effectively to market opportunities and potentials. The countries need to commit to further regional cooperation in order to exchange information, establish effective training programs, and undertake research and development on shea products.
- The *Codex Alimentarius* Commission has developed several guidelines and principles for agricultural products, their import and export inspection and certification, in order to facilitate international trade. Official and officially recognized inspection and certification systems are a fundamentally important means of food control. Inspection may occur at any stage in the production and distribution process, consisting of the examination of the food product or system for quality control of food, raw materials, processing and distribution thereof, including in-process and finished products testing, in order to verify that they conform to requirements.
- Certification has been also considered by Codex, and represents the procedure by which official certification bodies, or officially recognized certification bodies, provide written or equivalent assurance that foods or food control systems conform to existing requirements. Certification of food may be, as appropriate, based on a range of inspection activities, which may include continuous on-line inspection, auditing of quality assurance systems, and examination of finished products. Codex guidelines on inspection and certification are intended to assist countries in the uniform application of existing requirements and the determination of equivalency, thereby protecting consumers and facilitating trade in foodstuffs.

ADDING VALUE TO PROCESSED PRODUCTS FOR HUMAN CONSUMPTION

- Shea nut producing countries are facing problems in relation to commercialization and ensuring added value to their products in response to international market conditions and requirements. Most of the countries of the Africa region feel isolated and cannot readily access the technologies, quality control mechanisms and market opportunities available. These countries need further regional cooperation in order to facilitate the exchange of information, training, research and development opportunities, and to promote the establishment of an internationally grading system for sheanut and for shea butter.
- Such a system should be market driven, in the sense that each quality standard to be defined should correspond to a distinct market niche. It should include specifications of physical quality criteria, and standard testing methods applicable to specialized African laboratories; it should also include parallel field criteria which can be measured effectively at the village level in order to assess product quality as close as possible to origin. Such a system could also be associated in commercial contracts to a bonus system, whereby the selling price of the products would increase together with the improvement in the product quality above a specified minimum.
- It is essential to promote the training of the primary producers (particularly rural women) who are carrying out the collection of the nuts, and their processing into shea butter. This will help them to obtain a product of a better and consistent quality, and thus increase their incomes.
- Another need would be addressed by a program to promote the local processing, refining and packaging of high quality shea butter products in order to satisfy both local and international markets. Shea butter should be locally processed by improved methods in order to improve its quality, and to enhance its conservation characteristics. Through physical means, it can also be transformed into various products, which may interest various international markets (cocoa butter substitute, cosmetics) or local markets (margarine, cooking oil). Research has started in this area, and needs to be consolidated and extended.

ENVIRONMENTAL IMPORTANCE

The shea tree occurs in western, Central and eastern Africa in the semi-arid Sahelian and sub-Saharan areas referred to by traders as the “Shea Belt”. *Vitellaria paradoxa* subspecies *paradoxa* and *Vitellaria paradoxa* subspecies *nilotica* are the two main varieties recognized. The shea belt coincides with Acacia gums and resin belt in the pre-desert areas. Such products represent important resources for populations living in the rural areas, and these trees, in consideration of their capacity to resist semiarid conditions, thus constitute essential resources for soil conservation and the control of desertification. The protection of these natural resources constitute a fundamental priority in the United Nations Convention to Combat Desertification (UNCCD), in the struggle against poverty, the reinforcement of food security, soil and water conservation, and to bring about a more sustainable development.

Natural products are important sources of revenue for a number of countries in the arid and semi-arid zones of Africa, with particular reference to the Sahelian band. Despite their economic importance, the productive and commercial circuits have not evolved sufficiently in the course of the last decade; traditional production methods are still in use. This allows production, which may somehow meet demand with the (piecemeal) adoption of certain innovations, but will ultimately compromise the standards of production which modern commercial circuits demand. Besides stabilising an important source of financial revenue for the rural populations concerned, the development and distribution of useful woodland species - particularly *Vitellaria*, *Acacia* and *Commiphora* – would effectively meet the challenges for development of arid and semi-arid regions of the African continent.

The obstacles to sustainable development are as follows:

- Extreme poverty of rural folk.
- Rapid desertification.
- Reduced food and nutritional security.
- Deficiency of rural development and infrastructure.
- Marginalization of rural Africa in the context of the global market economy.

The establishment of a Network of Natural Gums and Resins in Africa (NGARA) in May 2000 represents a significant step toward the development of the gum arabic and resins sector in the dryland Sahel in order to reinforce food security, rural development and thus bring about effective poverty alleviation. An expansion of the network to the shea sector could represent an important approach for more effective cooperation among different stakeholders – the producers, the private sector and governments - in developing the sub-Saharan areas through development of the potential value of indigenous natural resources.

Local Government: The Role played by Government in the Shea Sector

**Mme Diallo Mah Koné
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Mali is a land-locked country, the economy of which is essentially based on the rural sector. The primary sector is the center of focus for any national policy of socio-economic development, as the rural percentage of the population constitutes up to 80 percent of the total population of the country. The rural sector contributes 40 to 45 percent of the gross domestic product, and 75 percent of national export receipts.

The plans and the programs devoted to the rural sector have occupied a key position from the time of Independence to the present day. Important investments have been dedicated to this sector, both from government and from its partners in development. However, the country possesses at the moment enormous assets and potentialities which are not always exploited rationally, and some important resources have thus remained under-valued.

This study was conducted for the purpose of agro-industrial promotion of the rural sectors by the Department of Commerce and Transport, with technical and financial support from the *Centre Agro-Entreprise (CAE)*.

National development strategy is based on a sectoral (filière-based) approach. Thus, Mali has a policy of promotion of the various productive sectors (filières), including the shea sector, with the object of not only strengthening the promotion of a given product, but also the productive activities related to (and both 'upstream' and 'downstream' of) the product itself. By this approach, an action plan for sectoral (filière-based) national policy for Mali was elaborated. On the basis of an assessment of about twenty agro-industrial sectors and their respective promotional policies, the 13 most robust sectors (including the shea sector) were identified, along with their strategy of development, and a proposition was made of the priority projects to which investment should be directed, as well as an overall strategy for their promotion.

The current economic policy aims to:

- promote sustainable economic development;
- reduce poverty, with the long-term objective of raising the living standards of the population; and
- assure financial viability over the medium-term.

Constraints to the Development of the Shea Sector

Poor organization and management of the sector; there is no relation of partnership between the producers and the other economic operators of the shea sector, each category of stakeholders seeking maximum benefit at the expense of the others. Thus, there is an absence of dialogue and coordination among and between the stakeholders of the shea sector, compounded by:

- poor level of organization of the producers;
- lack of professionalism among the economic operators;

- ineffective effective professional organizations;
- poor prices offered to the producers (via a profusion of intermediaries);
- weak technological development;
- high transport costs;
- problems of poor (and inconsistent) product quality;
- lack of an action plan for the shea resource at the national level.

PERSPECTIVES

- It is necessary that the government strengthens the support for the strong sectors - especially the shea sector - through its institutional support structures. It should create a framework for dialogue among the various stakeholders of the sector in order to elaborate a national action plan for development of the shea resource and reinforce the technological and organizational competences of the producers.
- Though it is widely recognized that the shea-tree constitutes an important resource – and a source of incomes - for rural women, its productive potential has not yet received the attention which it deserves from the government. There have, however, been isolated actions on the part of certain NGOs (notably the AMPJ), as well as a few governmental support structures established to address the needs of rural producers, such as the *Office de la Haute Vallée du Niger* (OHVN), and the *Compagnie Malienne de Développement des Textiles* (CMDT).

Actions undertaken for the promotion of the Shea sector

The Ministry of Rural Development (MDR)

The shea butter is a product of crop which provides a source of income to the rural women, in addition to its direct primary applications: food, cosmetic, pharmacopoeia, etc. For the promotion of the shea sector, the Ministry of Rural Development (MDR) has emphasized the sensitization and the informal education of the rural population.

In April 2000, the MDR established a working group consisting of the various stakeholders of the shea sector: the technical departments of government institutions, economic operators, NGO representatives, and donor agencies. One of the missions assigned to this group is to build upon experiences, and to provide information about new opportunities since the acceptance of the shea butter in the manufacture of the chocolate according to EU regulations.

Two types of programs were undertaken, consisting of

1) A short- to medium-term program

- A day of information about the shea sector was organized in May 2000 in association with the Coordination of Women's Associations and Organizations (CAFO). The objective of this event was to inform the target groups (the State, NGOs, donor agencies, and the private sector) about the current situation and the new perspectives of the Ministry of Rural Development and CAFO as regards the shea sector.

- Preservation of the productive potential of the shea resource; during the launch of the recent agricultural campaign at Ségou, the Minister of the Rural Development visited the research trial plots of the Institute of Rural Economy (IER) on genetic improvement, and proceeded to the shea plantation at Diado.
- Television coverage and broadcasts on rural radio stations of Sikasso and Koutiala on the valuation of the shea-tree.
- Inauguration of the shea processing center at Zantiébougou, established Malian Association for the Promotion of Youth (AMPJ).
- Training of the rural extensionists of the OHVN zone on aspects of shea processing.

2) A long-term program

By considering the interests, potentials and the various economic perspectives of the sector, the Ministry of the Rural Development envisages the following actions:

- The elaboration of programs for development of the sector (research, extension, processing technologies).
- Training and organization of rural women and the private sector.
- The establishment of a system of information, education and communication.
- A possible re-establishment of the Sika-Mali processing factory.

Office of the High Valley of the Niger (OHVN)

The office of the High Valley of the Niger (OHVN) is a rural development service constituted under the custody of the Ministry of Rural Development. Its mission is to promote the development of subsistence and industrial crops, to undertake any actions which increase the production, agricultural productivity, and the income of the farmers. By this, the OHVN undertakes agricultural extension, the promotion and the organization of the rural sector as a whole, training, environmental protection, regional outreach, the promotion of the productive non-agricultural activities of incomes and the development of the fields among which the shea sector.

With support from USAID Mali since 1993, the OHVN has introduced a program of sectoral promotion and the promotion of new opportunities within the framework of the strategy for sustainable economic development. This program aims to develop a realistic policy of sectoral promotion, with the aim of a sustainable increase in incomes of the farmers, particularly rural women. While fighting against poverty, the program tries to improve the professionalism of the private entrepreneurs, and to thus increase their competitiveness.

Within the framework of this program, many actions have been undertaken for the promotion of the shea sector, viz.:

A program of sensitization and publicity has been undertaken across the OHVN zone, in association with rural radio stations, on the potential of the shea resource, the importance of the shea tree in the national economy, its particular importance to the socioeconomic advancement of rural women, and in the fight against poverty; new technologies to

enable rural women to improve the various stages of storage, processing and packaging of shea products.

- Training of the rural extensionists in shea processing, from the fruit to the butter.
- Training of rural women on the same subject (45 women's groups were trained during the first campaign). The shea action plan which was then elaborated is now in the course of execution.
- A test of export of shea butter to the USA was undertaken.
- The OHVN gave its guarantee to allow the Malian Association of Exporters of Agricultural Products (AMEPROC) to obtain a bank credit from the BNDA bank for the purchase of 5 000 tons of sheanut and 2 000 tons of shea butter for the HUICOMA factory.
- A test of introduction of 50 shea presses is currently being evaluated by 45 women's groups.

In the context of maintaining the production potential

- Awareness raising on issues such as the natural regeneration of shea trees and policies to prohibit felling of shea has been carried out in OHVN
- A grafting test is being carried out at the experimental centre of OHVN in order to reduce the age of first fructification of shea trees. The shea trees are already planted.
- Grafting of wild shea trees has been carried out in some sectors of OHVN.

Role of Research Institutions in the Shea (*Vitellaria paradoxa* Gaertn C.F.) Sector: Scientific Experiences and Perspectives

Jules Bayala⁸

ABSTRACT

The shea-butter tree is a very important species for the people of its area of distribution, and also for the general populations across its area of distribution. The significance of the shea tree results from its excellent ecological role in the ecosystems which support it. The tree comes also serves a multiplicity of uses for a variety of stakeholders according to its various aspects, including the socio-cultural, nutritional, medicinal and economic. The significance of the shea tree to local populations was documented as early as 1797. During the colonial era, the economic significance of the tree led to scientific analysis and the beginnings of experimentation as from 1902 in Mali. From this time to our own, research on the shea tree has been characterized by the intermittent nature of the activities, the isolation of the stakeholders from one another resulting in a weak level of domestication of the species. Nonetheless, important scientific experiences have been gained in the socio-economy of the species, on the processes of transformation, the distribution of the species and its genetic diversity as well as in its management in the parkland systems. This paper undertakes to review the current state of knowledge in respect to these various domains, to identify the perspectives for future actions and it within the framework of a network focused on the shea tree, which build on the synergy between the different stakeholders of the shea sector.

1. INTRODUCTION

By its significance and abundance across its area of distribution, the shea-butter tree (*Vitellaria* sp.) plays at the same moment an excellent ecological role and constitutes an important resource serving the nutritional, medicinal, economic and cultural needs of the human populations who live with the tree. The species has therefore, from a very early time, attracted the attention of numerous scientists specialized in different disciplines (e.g. botany, sociology, ecology, geography and biology). But beyond the scientific disciplines, the challenging nature of research on the shea tree has consistently overwhelmed the limits of research institutions, the capacities of which are exceeded even at the present time. Indeed, if one starts from the principle that one of the pillars of research is observation, one can say that the research on the shea-tree dates back in time to the first publications by early travelers of the shea zone, such as Ibn Batuta in 1348 and Mungo Park in the 1797. These observers had noted that on the whole its area of distribution, which extends from Senegal in western Africa to Ethiopia and Uganda in the East, along a band of vegetation between 500 and 750 km wide, the shea-tree was omnipresent in fields (Bonkougou, 1987). Further, the current knowledge on the management practices which led to formation of agroforestry parklands (Knight, 1907; Ruysen, 1957; Pullan, 1974; Pelissier, 1980) indicate the existence of a deliberate human

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selection of the trees to be preserved in the fields which is consistent with the previous observations made since the 14th Century.

As is the case for many other species, the field of botany has generated furious and passionate debate, notably the name and classification structure of the species (Hall *et al.*, 1996). The evolution of the knowledge in botany has led to the current understanding of two distinct sub-species:

- *V. paradoxa* subspecies *paradoxa*, whom one finds from Senegal in western Africa to the Central African Republic; and
- *V. paradoxa* subspecies *nilotica*, which is considered to cover southern Sudan, Ethiopia, Uganda and the northeast corner of the Democratic Republic of Congo.

The first research activities concerning the culture of the shea tree began in Mali 1902, conducted by Vuillet at the station of Katibougou, followed by selection experiments at Koulikoro by Houard; these studies were abandoned in 1920 (Perrot, 1928; Sanou, 2000). A study of the same type, involving the sowing of seeds from an individual selected for the quality of its fruit pulp, was initiated by the inspector of agriculture Andrieu at the farm of Sotuba to Bamako in 1927 (Perrot, 1928). Afterward, the accent was put on the quantification and monitoring of production by the collection of nuts at the station of Saria from 1935. Nevertheless in 1936, attempts of selection on the shea tree were resumed in Haut Côte d'Ivoire (present-day Burkina Faso) and in Nigeria (Sanou 2000). These actions became intensified only in 1943 at the station of Ferkéssédougou, followed by further efforts at Niangoloko in 1955 (Delolme, 1947; Desmarest, 1958).

All of these studies aimed at addressing the constraints connected to the following problems of the field: misunderstanding of the production potentials, misunderstanding of the techniques of propagation and culture of the species, late maturity (first production at 12-15 years), difficulty in the extraction of the butter, poor yield by traditional methods of extraction (27% or less, as compared to a total lipid content of about 50%), strong odor smell and rancidity some butter, the conquest of the European market, and the diversification of the uses (Perrot 1928). At the instigation of the commercial marketing societies, certain stakeholders emphasized chemical analyses to assure the quality of the purchased products. The next generation of experimental activities began during the 1980s. But again, these actions were interrupted (Zerbo, 1987).

This history of research on the shea tree is thus characterized by a lack of continuity over time of the research activities on one hand, and the absence of coordination of the activities on the other, resulting in a weak distribution and exchange of the resulting information. Thus, the shea tree has always inspired great interest, despite the enormous constraints to development of the resource to its full potential. Among the outstanding issues can be identified the following: the weak level of domestication compounded by the poorly-understood fluctuations in production, the sporadic attempts of research initiatives which did not permit the achievement of results necessary to facilitate domestication of the species. It is in this context that the present meeting can contribute to consolidate and reinforce the experiences generated by all the individual efforts to date, while assuring coordination of current and future actions with the goal of developing the shea resource to its full potential.

2. SOCIAL AND ECONOMIC POTENTIAL OF THE SHEA TREE

2.1 State of the knowledge on the socioeconomic importance of the shea tree

From the ethnobotanical perspective, the aspects of the resource which have received the greatest attention are the cultural role of the species, the identification of its uses (Table 1) and quantification of the nutritional value of the products of shea tree through chemical analyses (Heckel, 1897; Knight, 1907; Bognounou, 1988). From the cultural perspective, the shea tree assumes a cosmic aspect by its nourishing character; by its fruits which come as a providence at a time when people have nothing else to eat, that is during the annual 'hungry season' (*période de soudure*). The fruit pulp, the butter and the protein-rich caterpillars (who subsist on the leaves) constitute the products which are consumed by man. The shea tree is considered sacred by numerous ethnic groups, and is seen as blessed by God. It is the symbol of the maternal tree, and by this fact the tree is utilized at birth as well as in death (see Table 1), and occupies a place of importance in numerous cultural and religious ceremonies (Kaboré, 1987; Hall *et al.*, 1996).

Studies on the products of the shea tree are concerned primarily with the qualitative aspects (Heckel, 1897; Chevalier, 1907; Delolme, 1947; Prost, 1957, Bognounou, 1988; Boffa *et al.*, 1996; de Saint Sauveur, 2000, 2001), and very few on the quantitative aspects (Hall *et al.*, 1996; Lamien *et al.*, 1996). Those studies which do address the quantitative aspects indicate that the average daily consumption of shea butter can range between 15 and 30 g (Bourlet, 1950; Hall *et al.*, 1996; Lamien *et al.*, 1996). The butter, extracted from the exported kernels or exported directly, is used as a substitute for cocoa butter, and in the cosmetic and pharmaceutical industries. Two hundred tons of butter a year are used in cosmetics, but the potential demand in this domain is estimated at 1 500 tons (Becker and Held, 2001).

Table 1: Inventory of the uses of the shea tree

<u>Parts Used</u>	<u>Uses</u>	<u>Processes</u>
Leaves	Medicinal	Decoction against eye problems, dental neuralgias, as mouthwash, for treatment of stomach problems, head problems
	Cultural	Protection of newborns, to cover the dead, preparation of masks
	Fodder	According to the periods of the year, according to years and zones
Flowers	Nutritional	Salad, Nectar converted to honey by bees
Fruits	Nutritional	Elemental content close to that of the banana, with the exception of vitamin E
	Medicinal	Laxative
Kernels	Medicinal	Decoction used to treat malaria
Shell	Construction	Preparation of bricks
	Production	Composted into a fertilizer
	Energy	Burned

Butter	Nutritional	Edible oil, cooking fat
	Industrial	Margarine base, cocoa butter substitute in manufacture of chocolate
	Medicinal	Used pure or mixed with the ashes of galls of <i>Balanites aegyptiaca</i> against joint pain, treatment of sore throat by licking some butter spread over a knife-blade and passed over a flame; treatment of wounds (sometimes using kapok fiber as an absorbent); treatment of Guinea worm, skin ulcers, rheumatism; lubricant in massage
	Cosmetic	Creams, perfumes
	Construction	Roughcasting of houses
Presscake/ Seed Residues	Energy	Burned in lamps as illuminant
	Construction	Roughcasting of houses
	Parasites repellent	Used as a termite repellent; against insect predation of vegetables; against mosquito larvae in wells; against animal parasites, to protect stored foodstuffs from insects
	Energy	Burnt as fuel
	Production	Compost, adulterant of cattle feeds (but has toxic properties)
Bark	Artisanal	Used in making musical instruments
	Leather working	Used in tanning process for softening of skins
	Medicinal	Chewed as a treatment for leprosy; to facilitate childbirth; against amoebas and other gastric problems (diarrheas, dysentery); to facilitate the production of milk by breast-feeding women; to treat snake-bite
Wood	Artisanal	Termite-resistant wood used in house construction and as fence-posts
	Energy	Used to make the finest quality charcoal
Sap	Cultural	Construction of funeral beds of chiefs
	Hunting	Latex used to trap birds
	Medicinal	Used to treat the bites of venomous insects
Root	Artisanal	As glue in the musical instruments
	Medicinal	Diarrheas, stomach problems, cleaning teeth
Caterpillar (<i>Cirina butyrospermi</i>)	Nutritional	Eaten fried; very rich in protein
Plant Parasite (<i>Tapinanthus</i> sp.)	Medicinal	Leaves and twigs dried, burnt and reduced to powder, mixed in porridge or in water against Guinea worm

Source: Bognounou, (modified) 1988.

Nutritional significance of the shea tree

The analysis of chemical composition has been undertaken at the instigation of the industrial companies and importers (Traoré and Barro, 1988; Cissé, 1988). In addition to the published literature (Perrot, 1928; Delolme, 1947; Traoré and Barro, 1988; Cissé, 1988; Hall *et al.*, 1996), one important study is currently in progress in Israel, Italy and Denmark within the framework of a project (INCO-DC ERBIC18-CT98-0261), Improved Management of the Agroforestry Parklands of sub-Saharan Africa. Shea nuts from ten countries have been analyzed, giving a content in oil ranging from 20 to 50 percent. The trees of Ghana, Guinea and Uganda showed the highest yield of total lipids, with a combined mean of about 43 percent (Wiesman and Maranz, 2001). Delolme

(1947) had already found similar rates for sheanut of Côte d'Ivoire (ranging from 29 to 51%). The results obtained by Wiesman and Maranz (2001) also confirmed the high levels of oleic acid in sheanut from Uganda (50-60%), resulting in a liquid butter, contrary to the solid shea butter of the populations ranging from Senegal to Nigeria where the stearic acid levels of about (50%) result in a solid product. Chemical analyses of the fruit pulp (Traoré and Barro 1988, Cissé 1988, Hall *et al.* 1996, Wiesman and Maranz, 2001) indicated a protein content ranging from 2.5 percent to more than 10 percent. According to Ouedraogo (1987), caterpillars contain 55 g of proteins for each 100 g of dry matter. They are thus richer in protein than beef (at 19 g), the meat sheep (17 g) and less rich than dried fish (61 g) according to the same author.

Commercial significance of the shea tree

The marketing of products derived from the shea tree on the local markets has been the object of several studies, among which may be noted those of Hasberg and Coubalibly (1989), Pasco (1990), Lamien *et al.* (1996), Nikiéma (1997) in Burkina, Becker and Held (2001) in Burkina, Mali, Nigeria and Uganda, and Schreckenber (1996) in Benin. The majority of commercial transactions are limited to local markets, and this is partially due to the generally weak capacities for processing. The price per kilogram of dried kernels generally ranges between FCFA 25 and 117, and that of the butter between FCFA 172 and 540 in Burkina Faso (Lamien, 1996). The local marketing of caterpillars (*Cirina butyrospermi*) has also been studied by Hasberg and Coulibaly (1989), Ouédraogo (1987), Hall *et al.* (1996) and Lamien (1996). The price per kilogram ranges between FCFA 385 and 600 (Lamien, 1996).

As regards the marketing of shea products outside the African continent, as early as 1903, Perrot (1928) raised the possibility of the export of 10 000 tons of shea butter from French Western Africa (AOF) to the European market. According to the same author, the products of the shea tree should obtain a substantial profit for the local people, a happy prospect for countries as Burkina Faso (formerly Upper Volta), where until then no remunerative export culture had been established. The forecasts of this author came true, as confirmed by the development of exports from 474 tons of kernels in 1913 for all the A.O.F to 60 000 tons in 1985 for Burkina Faso alone (Bonkounou, 1987; Boffa *et al.*, 1996; Becker and Held, 2001). However, export figures subsequently declined, as a result of product quality problems, to only 7 600 tons only 1999 for Burkina Faso (Becker and Held 2001). Thus, the recorded tonnages exported for the entire continent in 1999 would be only 29 300 tons of sheanut and 1 200 tons of shea butter. A reduction in price, which fell from FCFA150 per kg in 1984 to FCFA 50 per kg in 1987 (Serpentié *et al.*, 1996), also contributed to the reduction of the volumes exported.

The two main products of the shea-tree (kernels and butter) were the object of study of the world shea sector, with particular reference to Burkina Faso, by Terpend (1982); that of Burkina, Mali, Nigeria and Uganda by Becker and Held (2000, 2001). Studies of a more limited scale have concerned the quantities of products sold from day to day, and the price fluctuations by location (Hasberg and Coubalibly, 1989; Pasco, 1990; Nikiéma, 1997) or between several locations taken together (Lamien *et al.*, 1996). At this level, women constitute an important link in the chain because they are the primary collectors and the traditional processors. For example, in Nigeria at least 75 percent of the actors are elderly women, as compared to 25 percent of men - but this ratio varies according to different regions. In this same country, the sale of nuts contributes to local incomes at the

level of 25-32 percent (Becker and Held, 2001). At the household level, Boffa *et al.* (1996) showed that 66 percent of the returns from the sale of nuts accrue to the women of Thiougou in southern Burkina Faso.

2.2 Areas of concern for future investigation

An overview of the results of studies on the socioeconomic aspects of the resource indicates:

- A limited availability of quantitative data on the consumption of shea products and derivatives per person and/or by household;
- An absence of policies for development of the commercial potential of shea products, the marketing of which remains informal;
- A weak exchange of information between stakeholders of the shea sector - for the greater part women – strongly linked to the poor organization of the sector;
- The risks incurred by sector stakeholders in their efforts to develop the sector.

In response to these issues, the following actions are recommended:

- Qualitative and more especially quantitative evaluation of the various types of products (both simple and derived) as utilized by the various consumers.
- Study of the diversity of shea products and investigation of their corresponding commercial opportunities.
- Facilitation of exchange between producers, researchers and policy-makers.
- Study of the consequences on the traditional users of shea products, *i.e.* the women, in response to new issues and potential product applications.
- Study on resource access and tree tenure to favor more efficient collection of nuts and encourage organized initiatives of shea stakeholders for the development of high-quality shea products.

3. PROCESSING AND DIVERSIFICATION OF SHEA PRODUCTS

3.1 State of knowledge on the processing of shea products

The studies of this domain have attempted to describe the processes of collection, treatment, storage and transformation of kernels (Heckel, 1897; Knight 1907; Delolme, 1947; Prost, 1957; Boffa *et al.*, 1996, de Saint Sauveur, 2000 and 2001). The authors have consistently described the length, the arduousness and the poor yield of the traditional processing methods. Efforts at improvement have not addressed the resolution of the problems of collection due to the nature of the product, which is not cultivated, but rather gathered from "natural" stands. Nevertheless, at instigation of the companies engaged in the marketing of kernels, technical advice has been elaborated for the collection the preparation of good quality nut. These recommendations have been put forward to the primary collectors of the sector (CSPPA/MCAP, 1988). Prior to the elaboration of these recommendations, there have been a series of isolated collaborative initiatives between commercial entities and research institutions, which have facilitated the identification and measurement of numerous quality parameters including indices of acid (FFA), saponification, iodine, peroxide, and moisture content). This has led to the establishment of the characteristics of a good nut (*e.g.* a moisture content of 8 percent for

sheanut), and to the advices - *e.g.* to parboil, shell and dry the nuts immediately after harvest (Traoré and Barro, 1988; Cissé, 1988). The three other aspects (treatment, storage, and extraction) have also received a great deal of attention toward the development of specific technical recommendations and improvements (Minoungou, 1988; Diallo, 1988; Masters and Puga, 1995).

For instance:

- Ovens for drying the nuts.
- Infrastructures for storage and preservation of the quality of the stored nuts.
- Tools of extraction of the butter (*e.g.* kernel grinders, roasters, manual presses, filter-presses).
- Analysis of the quality of sheanut and shea butter.
- Transformation of shea butter into secondary products and formulations (soap, creams, *etc.*).

To widen the consumer base for shea butter at the local (mostly urban), level, and also to satisfy the market requirements of industrial consumers in the developed countries, works are in progress Institute of Applied Research in the Technological Sciences (IRSAT) of Burkina Faso - and certainly in the other countries of the shea zone as well. These efforts aim at the deodorization of the butter, bleaching, and fractionation, in order to diversify range of shea products including the whole butter as well as the stearin and olein fractions. These operations will be accompanied with a neutralization or deacidification of the product, which would considerably increase the monetary value of these products.

Investigations on the stability of the butter in respect to oxidation are in progress in Uganda through an improvement of the methods of storage. A comparison of samples of butter from roasted and non-roasted nuts was conducted, treated or not by two methods (alkali and phosphoric acid). The results indicated that the roasted nuts gave a more stable butter even without treated chemical treatment, and that the chemical treatment was effective in stabilizing the butter of unroasted nuts (Masters *and al.*, 2001).

[Editors Note: These results may be explained by the fact that the roasting process serves to denature the natural enzymes which may contribute to rancidification of the kernel lipids, as served by the process of parboiling in West Africa (a process not undertaken in Uganda, where the study was undertaken). It should also be noted that the roasting of nuts does increase the yield of oil as compared to unroasted nuts, but the roasting process tends to intensify the (already problematic) natural odor of the nuts, resulting in a distinctly 'foody' aroma which is quite unsuitable for the higher-value cosmetic and pharmaceutical applications. Parboiling may thus be seen as preferable to roasting for the production of shea butter for high-value applications, and it has the additional benefit of killing the seed - which prevents the process of germination from degrading kernel lipids during the drying process prior to (and during) storage. The wood-fuel requirements of parboiling do have significant environmental impacts, however, which should be considered in the analysis and development of recommended processing methods.]

3.2 Recommended areas for future investigation

In consideration of the above results, it further efforts should be applied toward:

- The inventory and the description of traditional and 'improved' processing methods, to be followed by an evaluation of these techniques.
- The identification and development of new or improved methods of post-extraction processing for the diversification of high-value secondary products (*e.g.* to develop uses for the unsaponifiable fraction of interest to the cosmetic and pharmaceutical sub-sectors).
- The training of primary collectors on the recommended methods of harvest, treatment and storage which assure a good quality nut.
- Development of, and training in, improved methods of extraction and post-extraction processing for product quality and product diversification.

4. CHARACTERIZATION OF THE POPULATIONS AND GENETIC DIVERSITY OF THE SHEA TREE

4.1 State of knowledge on the populations and genetic diversity of the shea tree

Distribution of the shea tree

The works on the populations put in evidence its area of distribution in the regional scale, national and local. The shea-tree extends from Senegal to Ethiopia and Uganda. Across a band of vegetation 500 to 750 km wide including 19 countries. *V. paradoxa subsp paradoxa* is found in Senegal, Gambia, Guinea, Guinea Bissau, Mali, Niger, Côte d'Ivoire, Burkina Faso, Ghana, Togo, Benin, Nigeria, Chad, Cameroon and Central African Republic, while *V. paradoxa subsp nilotica* is indigenous to Ethiopia, Sudan, Uganda and the extreme northeastern corner of the Democratic Republic of Congo (Knight, 1907; Bourlet, 1950; Bonkougou, 1987; Hall *et al.*, 1996). On a national scale, resource assessment studies on the areas and densities of distribution have been conducted in Burkina Faso (Teribble, 1975; Bonkougou, 1987; Ouédraogo, 1995); Mali (Ruysen, 1957; Cissé, 1995); Nigeria (Pullan, 1974; Seignobos, 1982); Uganda (Masters and Puga, 1995), etc. These studies have made possible the analysis of relative densities of the species, and have brought attention to the threats which pressure certain populations.

There are also more precise results on the characterization and the dynamics of the populations of shea tree through studies on the scale of soils. One can quote the works on the shea tree at the area level such as Boffa's (1995) on the Mossi Plateau; those of Ouédraogo (1994, 1995) and Guira (1997), Bayala *et al.* (2000) on western Burkina Faso; those of Bernard *et al.* (1995) in Côte d'Ivoire, those of Schreckenber (1996) in Benin, etc. Because of the pressures resulting from human population growth which affects the regeneration requirements of the species during the fallow period, the reduction in duration of which is has resulted in a population a structure which grows unbalanced toward predominance of older trees. Impacts on the species from expansion in the area of land under cultivation combined with the trend toward intensification of agriculture and reduction of fallow have been exacerbated by the effects of climatic changes and increased agricultural mechanization (particularly in the cotton zone), resulting in a

population structure characterized by an absence regenerative growth (Ouédraogo, 1990; Gijssbers *et al.*, 1996; Boffa *et al.*, 1996; Iktam, 1998; Bayala *et al.*, 2000).

Generally one notes that the shea tree is adapted to the savanna zones characterized by a dry season of 6-8 months, annual rainfall of 600-1400 mm, and an annual average temperature of 25-29 Degrees C. The species is endemic to low altitudes, occurs on a wide range of toposequences (ranging from 100-1600 m), with the exception of easily flooded areas. The tree grows on all soil types, even on stony ground, showing a preference for sandy loams with an adequate organic layer (Heckel, 1897; Knight, 1907; Desmarest, 1958; Hall *et al.*, 1996).

Genetic variety of the shea tree

Studies on phenology have highlighted important variations between populations and within the same population as regards the fall of leaves, the production of flowers and fruits, with a pressure gradient of precocity going from South to North (Delolme, 1947; Minoungou, 1988; Hall *et al.*, 1996; Osei-Amaning, 1996; Guira, 1997). Numerous factors have been identified as having an impact on the phases of development and reproduction, including the length and the quantity of rains, the effects of fire, local (silvicultural) management practices, and the occurrence and severity of parasitic infection. Whereas the fruit production is said to be cyclic by certain authors (on a cycle of 2 or 3 years) (Perrot, 1928; Delolme, 1947; Bourlet, 1950), according to others there would be simply a question of better or poorer production according to individual trees (Ruyssen, 1957; Desmarest, 1958; Boffa, 1995). The reasons for these contradictory results remain to be resolved (Hall *et al.*, 1996).

Bees constitute the main group of pollinators (Hall *et al.*, 1996). The preliminary results of the current studies on the genetic diversity of the species indicate that the populations of Uganda form a group distinct from that of central and western Africa. However, in western Africa one can distinguish two sub-groups of populations consisting of one group in Mali and Senegal and another in Benin, Burkina Côte d'Ivoire. However, between both extremes, notably Benin and Senegal, there would appear to have been some exchange of genes (Bouvet and Cardi, 2001). Other types of study began in 1999, notably on the biology of the reproduction, the floral characteristics, the dimorphism of the fruit and the seed, and experiments on pollination currently in progress in Burkina Faso, Mali and Uganda.

Despite the numerous studies undertaken to date on *V. paradoxa* (Hall *et al.*, 1996), many issues remain to be resolved concerning the biological and genetic aspects of the species. Indeed, if pollination is essentially entomophilic, the reasons for weak fruit yield in respect to the number of flowers remains to be clarified. As for the losses of productivity observed, are they physiological (division of nutrients between fruits and the other organs as the leaves) or ecological (problems of access by bees and other insect pollinators)? The current studies on the biology of reproduction including pollination will doubtless result in the means to optimize fruit yield. In addition to the environmental factors, there are certainly physiological or genetic factors which may explain the irregularity of the fruit production.

Strategies of conservation of the genetic diversity of the shea tree

Studies have been conducted on the diversity of *Vitellaria paradoxa* including collection of germplasm in Ghana (Adu-Ampomah *et al.*, 1995, Lovett and Haq, 1999a), and in Burkina Faso, Mali, Senegal and Uganda supervised by the International Centre for Research in Agroforestry (ICRAF). Information exists on the geographic distribution of the populations, on the sites of germplasm collected, and on the periods of fruiting. Attempts at characterization of provenances have been made in Ghana, Mali and Burkina Faso (Hall *et al.*, 1996; Niang, 2001).

4.2 Recommended areas for future investigation

Though the literature on the characterization of population of the species is plentiful, many of these papers lack precision. One of the major difficulties in the comparison of the data lies in the variability of the parameters used to describe the structure of the populations (*e.g.* at which point on the stem its diameter is measured, and definition of the classes of diameter or circumference).

The phenological studies have largely been limited to the periods of leafing, flowering and fruiting. On the other hand the information about the incompatibility of the male and female gametes is insufficient, though this avenue of study could help to explain the variations of fruiting between trees within and between specific populations. From the results discussed above, the following areas for further study may be recommended:

- Studies on the area of distribution of the species and the populations, correlated to factors in addition to those of soil typology.
- Analysis of densities and population structures (according to ages), monitored over time to elucidate the dynamics of regeneration and its relation to management practices.
- The biology, the ecology and the physiology of the species.
- Aspects of reproduction systems and the mode of reproduction of the species;
- Collection of germplasm and establishment of provenance trials.
- Selection of material from trees which display favored attributes and their distribution (*e.g.* fruit pulp, yield, chemical profile of the butter).
- Study of the heritability of the favored agronomic characters.
- Study of impact of human activities on the future of the populations.

5. PROPAGATION AND MANAGEMENT OF THE SHEA TREE

5.1 State of knowledge regarding propagation and management of the shea tree

Vegetative propagation

Grafting

The first experiments on grafting of the shea tree were begun by the Research Institute on Oil and Oleaginous plants (IRHO) in 1945. Two techniques were used, specifically the approach grafting and cleft grafting. The results suggested an incompatibility between the mature scion and juvenile rootstock to which it was transplanted. (Bonkounou *et al.*,

1988). This program was resumed by the Research Institute in Biology and Tropical Ecology and the Tropical Forest Technical Center (IRBET/CTFT) in 1985, also with the techniques of approach grafting and cleft grafting. The results of this work showed promise in overcoming the technical constraints to success of grafting *Vitellaria* (specifically drying of the scion and obstruction of the vascular union by the flow of latex) by the use of a cold frame to retain humidity and the soaking of scions in water for 30 minutes prior to the graft, with a rate of success of 25 percent. The optimum period for grafting (in Burkina Faso) was determined as being during the dry season, from November to March (Zerbo, 1987; Bonkougou, *et al.*, 1988; Grolleau, 1989). This period of attention was followed by a relaxation of the activities in the field of grafting for over a decade.

To re-launch and also refine the results of these predecessors, further work on the subject was begun within the framework of the project INCO-DC: Improved Management of Agroforestry Parkland Systems of sub-Saharan Africa (mentioned above), with activities undertaken simultaneously in Burkina Faso, Mali and in Uganda. In Burkina the average rates of success were 14 percent for the technique of veneer grafting, and 28 percent for shield grafting, with the strongest rates achieved on the order of 65-75 percent. The coppiced regrowth from tree stumps of one year was used successfully as rootstock, with scions cut from selected trees. Contrary to Zerbo (1987), the strongest rates of success were recorded during the months of more than 100 mm of rain, notably from May till September. One year after the grafting three transplanted wild children produced flowers and one gave fruits (Kambou, 2001). The attempts in Uganda were not decisive, probably because of a lack of appropriate equipment, complicated by the occurrence of unseasonably dry conditions during the experiment.

Rooted Cuttings

In 1986, experiments on propagation of the shea tree by rooting of cuttings were conducted by IRBET/CTFT using three types of plant material, including coppiced regrowth from tree stumps, the twigs of mature trees, and the stalks of seedlings produced in the nursery. Two types of hormone were used (AIB at 0.5% and AIA at 0.5%) as well as a fungicide (soaking 30 minutes in a solution of benlate). The results remained in the embryonic stage, with the report of appearance of swellings indicating possibilities of root formation (Zerbo, 1987; Bonkougou *et al.*, 1988). Without regard to environmental conditions, these results may indicate the use of too weak a concentration of the hormone, particularly as compared to those obtained in Ghana, where the development of roots on 42 percent of cuttings was obtained by using 1.5 percent IBA and AIA (Frimpong *et al.* 1993). This rate can even reach 80 percent with 100 percent survival after planting out, according to the time of year and environmental conditions (Opoku-Ameyaw *et al.*, 1997). This type of experiment, resumed from 2000 within the framework of the INCO-DC Parklands project, gave rates of 0 percent in Burkina, and 5 percent of the cuttings rooted in Uganda, where the best rates were recorded (34%) on cuttings taken from coppiced regrowth, indicating a significant effect of the hormone in this result. In spite of the difficulties encountered, there is hope for further development of techniques for rooted cuttings, and of tissue culture of *Vitellaria* in Israel. It was for example possible to effect vitro culture of young plants (Lovett and Haq, 1999b).

Layering and transplantation

The process of layering has resulted in less success, but has nevertheless given encouraging results. Experimental air and ground layering was conducted in 1986-87 in Burkina Faso, both with and without using hormone (Rootsone F. based on ANA, and Exuberone H or AIA 0.1 percent). The results were 2 percent survival for air layering and 15 percent for ground layering during the rainy period, with a significant effect of the use of the hormone Rootsone F. (Zerbo, 1987; Bonkougou *et al.*, 1988). However, significant aerial growth of the ground layered individuals despite their limited root development (insufficient to sustain the plants) would indicate that technical problems still remain to be resolved. The layering of runner roots did not give success.

The transplanting of wildlings 50-180 cm in height, individually or in pits, has resulted in survival rates from 11 to 76 percent. Irrigation had no significant effect (Zerbo, 1987; Bonkougou *et al.*, 1988). The rate of survival can even reach 96 percent (Delolme, 1947). The suitable period for this technique would be the dry season, corresponding to the period when plants are in the phase of leaf-fall. This technique has the particular advantage of resulting in plants which grow better than those growing directly from seed. Indeed, transplanted individuals achieved 63 cms in height and 10 cms in diameter in two years, against 19 cms in height and 2.5 cms in diameter for those growing directly from seed (Delolme, 1947).

The results obtained by all the techniques of vegetative reproduction, in spite of the lack of continuation of efforts, allow us to envisage a future development and popularization of certain techniques. The *Centre National de Semences Forestières* (CNSF) of Burkina Faso is in this phase with the grafting of coppiced regrowth from tree stumps or wildlings, and some of these plants have already begun to produce fruits.

Techniques of production and management of shea plants

Seeds and young plants

The reproduction by seed in the nursery has been the object of numerous research efforts. Problems concerning the physiology of the conservation and the germination include the recalcitrant nature of the seeds, which entails problems of conservation (Gamené *et al.*, 1998). Nevertheless, the fresh seeds germinate easily even if the rate of germination falls quickly to 0 percent by the end of the first month following their collection (Ruyssen, 1957; Gaméné, 1998), and from 95 to 35 percent when the moisture content passes from 40 to 20 percent (Gaméné, 1998). The nursery techniques have been mastered, but could be improved from an arboricultural perspective. Indeed, the early development of a large and deep tap-root creates problems in transplantation from the nursery. However, numerous experiments of direct sowing in the field have shown reduced growth rates as compared with plants raised in the nursery, which themselves grow less well than plants growing from cuttings and from transplants (Delolme, 1947; Zerbo, 1987; Bonkougou *et al.*, 1988; Hall *et al.*, 1996).

The microbiological approach generally developed to stimulate the growth of local fruit trees is limited to purely symbiotic aspects, apart from the work of Guissou *et al.* (1998a and 1998b). These experiments were also conducted essentially in the

nursery. *V. paradoxa* does not seem to respond to mycorrhization (Danthu, personal communication).

Management of mature trees

Traditional forestry techniques for management of the shea tree exist (Savenije 1993; Ki, 1994; Bayala and Lamien, 1995 and 1997, Timmer *et al.*, 1996), but as has already noted by Savenije (1993), the inventoried techniques have never been studied in detail. However, the inventories of methods have indicated that pruning (trimming to a lesser extent) was the most practiced traditional technique for management of the tree (Timmer *et al.* 1996). For the most part, this technique would be intended to improve the production of trees (Timmer *et al.*, 1996, Agbahungba and Depommier, 1989; Hall, 1996; Boffa, 1995; Ki, 1994; Kater *et al.*, 1992; Binnekamp, 1992). However, certain authors have suggested that pruning would have no effect in this regard (de Saint Sauveur, 1999; Kessler, 1992). One experiment of pruning showed that 30% of trees produced fruits two years after a total pruning.

Pruning has been observed to result in an improvement of the production of sheanut yield by as much as 34 percent, with an increase in total biomass of 46 percent over a period of 2 years (Bayala *et al.*, 2001). This would appear to be the result of a more productive allocation of nutrients by the tree, as well as a reduction of the competition for water and light. Indeed, the totally pruned tree transpires on average 1.6 liters of water per hour - as compared to 1.8 liters per hour for the tree not pruned in rainy season (Bayala *et al.*, in press). Even if, at this stage, one cannot yet speak about improvement of fruit production, it is very likely that the conjugation of the improved production of associated cultures (*e.g.* millet) and the possible gain in fruit production will result in an overall increase of average incomes as a result of pruning over the medium- to long-term long term.

Aside from the improvement of production, a reduction in size would be a means of checking of certain parasites such as *Tapinanthus* sp. (Boussim *et al.*, 1993). This parasite can affect up to 95 percent of the individuals in a given area according to Boussim and al (1993). Two years after pruning, only 30 percent of the observed individuals were infected by the parasite, mainly as a result of regrowth from the vascular remnants of old points of infection which survived the pruning of the outer branches. These results are in agreement with those of Sallé and Boussim (2001) who recommends cutting of the branch some centimeters below the bundle instead of limiting the pruning to the destruction of the bundle itself, which would be ineffective. The works of these authors would have shown the existence of individuals not infested by *Tapinanthus* following attempts of establishment by the parasite. Attempts at chemical control of *Tapinanthus* would indicate that two applications of the product used (*e.g.* Calliherbe, Roundup), are sufficient to destroy the parasite. During this experiment, *T. dodoneifolius* appeared more sensitive than the other two subspecies (*T. globiferus* and *T. ophiodes*) of relevance to the study (Sallé and Boussim, 2001). However, the fruit character of the species necessitates great caution in the use of products which are systematic and which could thus manifest chemically in the fruit. Research on natural enemies of *Tapinanthus* has resulted in the identification of four groups: The birds which feed on the embryo, larvae which develop in the haustorium of the parasite, the insects which destroy leaves, and insects which destroy the flowers.

In Uganda, an inquiry on the parasites of the shea tree identified plants such as *Phragmanthera usuiensis*, borer insects including *Philemantium astabolium*, *Crypborihynchus magniferae* and *Eupsatis* sp.; diseases such as *Alternaira alternata* and *Pestalotia* sp were also identified, though little is known of their effects on yield (Masters, 2001). An important study on the biology of the caterpillar *Cirina butyrospermi* and the impact of this caterpillar on the fruit production of the shea tree was carried out in Burkina Faso by Ouédraogo (1987). This study indicated that the defoliation caused by caterpillars was detrimental to the productivity of the tree. The ecology of the caterpillar of the shea-tree is currently under study in Nigeria (Odebiyi *et al.*, 2001).

Works on the identification of the motivations behind silvicultural practices have shown that the economic value of the products of the shea tree does not seem to have a positive impact on its management in Burkina Faso and Mali, contrary to Uganda. The reasons are that rural women - the main stakeholders in the exploitation of shea products – have no power of decision in management of the trees; the status of the tree becomes confused with that of the land on which it grows. On the other hand, the situation may be more favorable in Uganda because the women have more right of tree tenure, and also because the products of the shea tree generate greater incomes for the stakeholders of the shea sector as compared to western Africa, particularly in Burkina and in Mali (de Saint Sauveur, 2001).

5.2 Recommended areas for future investigation

The domain of management is the one that accumulated most experience; nevertheless, several aspects remain to be clarified of among which can be identified:

- determination of specific methods for storage and conservation of the seeds of shea tree;
- determination of horticultural techniques of vegetative propagation, *e.g.* refinement of grafting and rooting methods;
- the optimization of the techniques of nursery culture and planting out in the field, *e.g.* containers, substratum, relationship between fertilizer and the mycorrhizae;
- the development of techniques of management for an optimization of the fruit production and/or that of the associated cultures.

CONCLUSION

In conclusion, the data on the distribution and density of the stands remains marked by the inconsistency of the methods used. It is urgent to elaborate a harmonized method of inventory and characterization of the populations of the shea tree to allow for the development of a coherent and useful data base for the monitoring of the dynamics of the populations. This will necessitate the determination of reference sites, selected according to a gradient of aridity and/or increasing land-use pressure, with evaluations conducted at regular intervals.

Aside from the imbalance between the number of studies dedicated to the subspecies *V. paradoxa* and those of the subspecies *V. nilotica*, the physiology of the tree remains a little-studied domain. Therefore, it has not always been easy to identify reasons for the

failures of experimental plantations, which could partially explain the weak interest in planting methods plantation on the part of the producers.

The encouraging results of work on vegetative multiplication provide a source of hope for an increased distribution of the tree (as well as the multiplication of trees displaying desired characters), but especially for a reduction in the juvenile period prior to production. The provenance trials which have been initiated in Ghana, Burkina Faso, Mali, Uganda, *etc.* constitute a supplementary stage towards the domestication of the species by its genetic improvement. It should be noted that the improvement of the shea tree is by definition a very long-term activity, necessarily inclusive of a wide variety of interventions, from the immediate and local to the large-scale, regional and international.

At the same time the results of management studies on the juvenile and mature shea tree should continue multiply, for the purpose of an increased (and more consistent) fruit production and control of the parasites which affect productivity, but also toward a more efficient and harmonious association with the associated annual crops of the agroforestry parklands. All these actions should be supported by long-term institutional and funding commitments, in order to avoid the wasteful and counter-productive effects of discontinuity in activities seen again and again across the region.

All the information on the socioeconomic and biophysical aspects of the shea resource should be put at the disposal of the stakeholders of the shea sector (*filière karité*), using the most appropriate methods to reach practitioners at every level (*e.g.* written and audiovisual material, training and exchange visits).

A system to allow for the exchange of information should be established, to include all sector stakeholders through a central database. Considering the various aspects and levels of inquiry addressed by the efforts of various research institutes, scientific visits should be organized to enable researchers to improve their competence. It is desirable that all these actions are facilitated by the creation of a network on the shea tree.

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2 SUPPLEMENTARY PAPERS (Country Studies)

Shea in the North of Côte d'Ivoire: Possible uses, process of transformation and aspects of marketing

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ABSTRACT

Ethnobotanical studies on the shea tree in the context of rural populations and the stakeholders of the shea sector have allowed us to situate this important woodland species in the socio-cultural and spiritual customs of these populations. The tree is used in all its forms: roots, bark, fruits, leaves, butter, press-cake and even its plant parasites (of the family of *Loranthaceae*, mistletoe) are used by the local populations in culinary, therapeutic, cosmetic, lucrative and cultural applications, etc.

In the African shea zone, the harvest or the collection of the shea fruit is made very early the morning by rural women. After harvest, several possibilities offer themselves to the producers. The fresh nuts are directly dried in the sun, or dried in the oven. There are also several techniques used for the transformation of shea kernels into butter (the traditional method, the artisanal method and the partly industrialized method), the artisanal method is the most used today. The main products traded within the shea sector are sheanut and shea butter. These are not only sold for cash, but are also exchanged for tools of the kitchen, spices and even for food.

Keywords: shea; kernel; butter

PROBLEM

The shea-tree (*Vitellaria paradoxa* C.F. Gaertn.) is a keystone species of the parkland agroforestry system of the Sudano-African savanna. Sheanut and shea butter are international commodities today, and they constitute a primary source of monetary income for rural women across this region, contributing significantly to the GDP of the countries where its presence is important.

Attempts at vegetative reproduction and genetic improvement (Haïff, 1945) and studies on the dynamics of the populations (Delome, 1947) began long ago in the agricultural research station of Ferkessédougou in the North of Côte d'Ivoire. Today, in spite of the absence of financing and any real research program on the plant, some results have been realized.

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From the genetic perspective, a study of evaluation of the genetic variety of a shea tree population at Tengrela in the North of Côte d'Ivoire allowed us to analyze and to identify the most successful descriptors of the shea tree (Nafan, 2000).

Other work has addressed the production of fruit, and resistance to the plant hemiparasites of the family of Loranthaceae, *i.e.* *Tapinanthus* sp. (Soro, 1999).

In spite of the excellent nutritional and economic value represented by its products, human pressure and infection by *Tapinanthus* have combined with the absence of an effective strategy of regeneration to threaten the shea populations with ageing and eventual disappearance if no preventative or ameliorative action is taken. Also, the agronomic research is still confronted with the problems of domestication of the species, particularly in respect to the long juvenile period before the first fruiting, as well as the considerable variability and fluctuations in yield which are not well understood. The industrial valuation of its products is insufficient, and their export is not still rational.

Faced with all these problems, is necessary to establish a workable and effective policy of conservation, management and sustainable use of the phylogenetic resources of the species, in order to develop programs of genetic improvement and selection of successful varieties with high yield in order to support the domestication of the species, as well as the qualitative exploitation of its products.

Studies undertaken in collaboration with the rural populations of seven departments of the North of Côte d'Ivoire (Nafan, 2001), constitute the first step toward a vast program of genetic characterization and ecogeography of the populations of the tree across the African shea zone.

The results of this initial work have allowed us to:

- To localize the major zones of diversity of the species, and the periods of production of sheanut in Côte d'Ivoire.
- To know the various possible uses of the species.
- To collect the maximum of information about the plant and its environment, as well as its role in traditional agrarian systems.
- To understand the productive and commercial parameters of the shea tree, and to identify the various stakeholders of the shea sector.
- To study the locally-appropriate technologies for drying, storage and processing of the products of the shea tree.

VARIOUS POSSIBLE USES OF THE SHEA-TREE

The shea-tree is considered as a sacred tree by the peoples who live with it, who maintain that the species possesses supernatural powers. It is also one of the rare oil plants of the savanna, the butter of which replaces imported food oil for these populations. The butter of the shea tree also contains countless therapeutic virtues – organoleptic, cosmetic, etc. (see Table I).

Table I: Possible uses of the karité (from: Nafan, 2001)

USAGE	CULINARY	PHARMACEUTICAL AND MEDICAL	COSMETIC	OTHER USES
EXTRACTS				
BUTTER	<ul style="list-style-type: none"> ◆ Food Oil ◆ Preservation of food (meat in particular) 	<ul style="list-style-type: none"> ◆ Care of sprains ◆ Massage ◆ Healing Skin ◆ Revitalizing (fatigue) ◆ Adjuvant ◆ Eye drops (care of eyes) 	<ul style="list-style-type: none"> ◆ Skin cream ◆ Hair straightener ◆ Pomade 	<ul style="list-style-type: none"> ◆ (Traditional) soap-making ◆ Fuel for lamps ◆ Anointing oil (in traditional ceremonies) ◆ Waterproofing (houses)
LEAVES		<ul style="list-style-type: none"> ◆ Analgesic (head, stomach, eyes.) ◆ Care of Oedemas, decline of the sight, stomach ulcers ◆ Restores menstruation 		<ul style="list-style-type: none"> ◆ Occult practices ("disenchantment" of houses, cleansing ceremonies) ◆ Increase of the yield of shea oil
ROOTS		<ul style="list-style-type: none"> ◆ Treatment of jaundice, rheumatism, stomach problems ... ◆ Restores menstruation 		
MISTLETOE (<i>Tapinanthus</i> sp.)		<ul style="list-style-type: none"> ◆ Fight against breast cancer ◆ Antibiotic (dysentery) ◆ Antipyretic ◆ Analgesic ◆ Used to facilitate the childbirth (psychoprophylactic) ◆ Treatment of jaundice, rheumatism ◆ Increase of fertility (human and animal) ◆ Etc. 		<ul style="list-style-type: none"> ◆ Used for the training of dogs ◆ To bring good fortune ◆ Increase the productivity of crops ◆ Seduction
BARK AND LATEX		<ul style="list-style-type: none"> ◆ Treats problems of heart and of teeth ◆ Cough suppressant ◆ To treat jaundice, bleeding gums, stomach ulcers ... ◆ Disinfect wounds and cures the bites of scorpion 		
WOOD				<ul style="list-style-type: none"> ◆ Biomass (fuelwood, charcoal) ◆ Woodworking ◆ Bark used in dyeing

PRESSCAKE AND NUT RESIDUES				<ul style="list-style-type: none"> ◆ source of potassium hydroxide for soap factories ◆ Cooking fuel ◆ Fight against Striga spp. ◆ Fight against termites
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SHEA PROCESSING

The harvest or collection of the shea fruit is essentially done by women very early in the morning, for those attending to other activities such as cultivation, and throughout the day for girls and certain older women.

Methods of drying sheanut

After the collection of fresh fruits, nuts are dried by two main methods according to the custom of every region. They are parboiled in boiling water, then dried afterward in the sun, or in earth ovens built specially for the purpose. They are also dried directly in the oven, or in the sun without parboiling.

Methods of storage of shea kernels

In villages, the storage of the dried nuts is done in granaries, inside ovens, on shelves, and in jute bags. According to our investigations on the ground, properly dried nuts can be stored for a year or even more. The storage of kernels is done by wholesalers and exporters in jute bags stored in warehouses. The duration of this type of storage rarely exceeds five months.

Methods of extraction of the butter

During our expeditions, we were acquainted with three techniques of extraction of shea butter: the traditional or artisanal method; the mixed or semi-artisanal method, and the partly industrialized method.

1) The traditional method

The extraction of the butter is a long and painful operation. The various stages of the extraction of the butter are:

- Shelling of nuts in the mortar followed, by the separation of the residues of hulls.
- Crushing of kernels in the mortar.
- Roasting the kernels powder in a pot.
- First grinding of the roasted powder in a mortar (rough roasted paste).
- Second grinding between stones (very fine roasted paste).
- Kneading of the fine dough until a whitish cream is obtained.
- Extraction and heating of the whitish cream until the pure oil is obtained.

2) Mixed method

It is the same stages which are involved in this method, but the difference between the traditional method and the mixed method is generally the use of a mechanical mill for the crushing and the grinding.

3) The partly industrialized method

The industrial extraction of shea butter is done according to two types of processes: the mechanical pressure under heat, and by solvent extraction. Most of the partly industrialized units of extraction of shea butter use the method of the pressure under heat because the extraction by solvent may damage the intrinsic properties of the butter through contamination by trace amounts of solvent residues.

Of the three units of partly industrialized extraction of butter in Côte d'Ivoire, only that managed by the WOMINGNON Company is currently functional. This unit is based in the city of Ferkessédougou in northern Côte d'Ivoire. The construction of the factory and the installation of machines were cofinanced by a Spanish NGO and by the Basque Government (Spain). The electrification of premises was undertaken with the financial support of the German donor and technical agency GTZ (through the Pader-Nord project).

Womingnon works in association with the women's associations based in the surrounding villages, which are in charge of collecting the sheanut of good quality for the extraction unit, which buys locally and transports nuts to the factory. It is necessary to note in the passing that this factory is provided with a machine used for the crushing of nuts, an automated unit to roast the crushed kernels, of a vacuum feed mechanism which takes up the crushed and roasted kernels and eject them directly into the press. The oil from the press is directly taken up and filtered by a filter press.

The obtaining of the oil in a partly industrialized way requires the following stages: the washing of kernels, followed by drying them in the sun; the roasting of the kernels in the roasting unit; then the extraction, done by pressing, and finally filtering of the obtained oil in the filter press.

Problems encountered in shea processing

We were informed of cases of inconvenient quarrels among the shea producers during the harvest, for the most part attributable to violations of territory. Indeed, the status of shea crop often entails problems of tenure and access to the trees.

The problems usually met during the drying by the women are the rain, the problem of fuelwood for the ovens, and the nuisances caused by the rambling of domestic animals such as pigs, cows, kids etc.

Regarding conservation of nuts, women seem to have no problems if nuts are dried well. On the other hand, the wholesalers are confronted with problems of decay of stocks, and with the attacks of caterpillars and weevils which can turn kernels into powder.

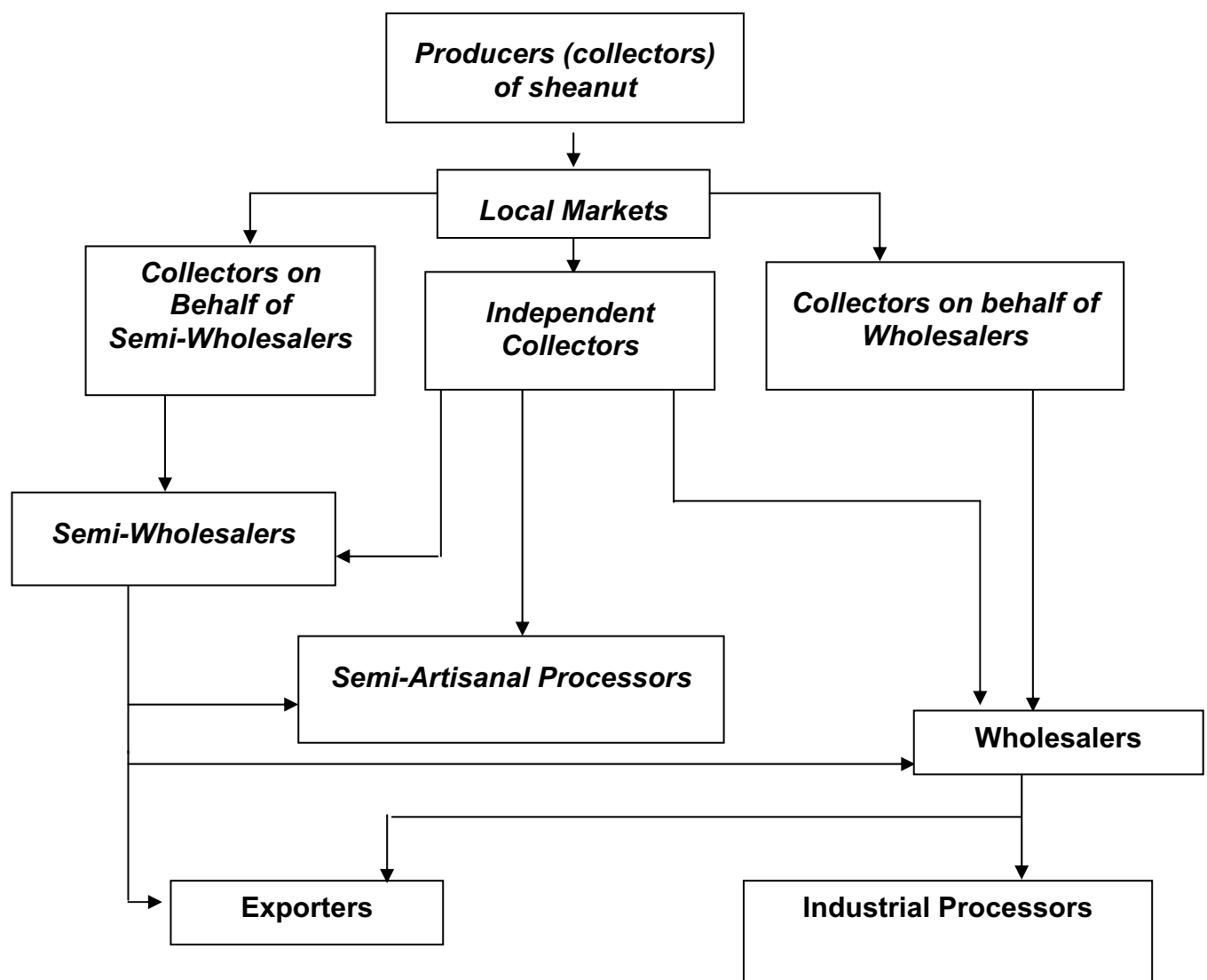
Regarding extraction of the oil, the poor quality kernels bring problems, and the winds of the *harmattan* seem to prolong the duration of the operation.

MARKETING OF SHEA PRODUCTS IN IVORY COAST

Several actors intervene in the field and the exchanges are made around the produced sous almonds (kernels) and shea butter.

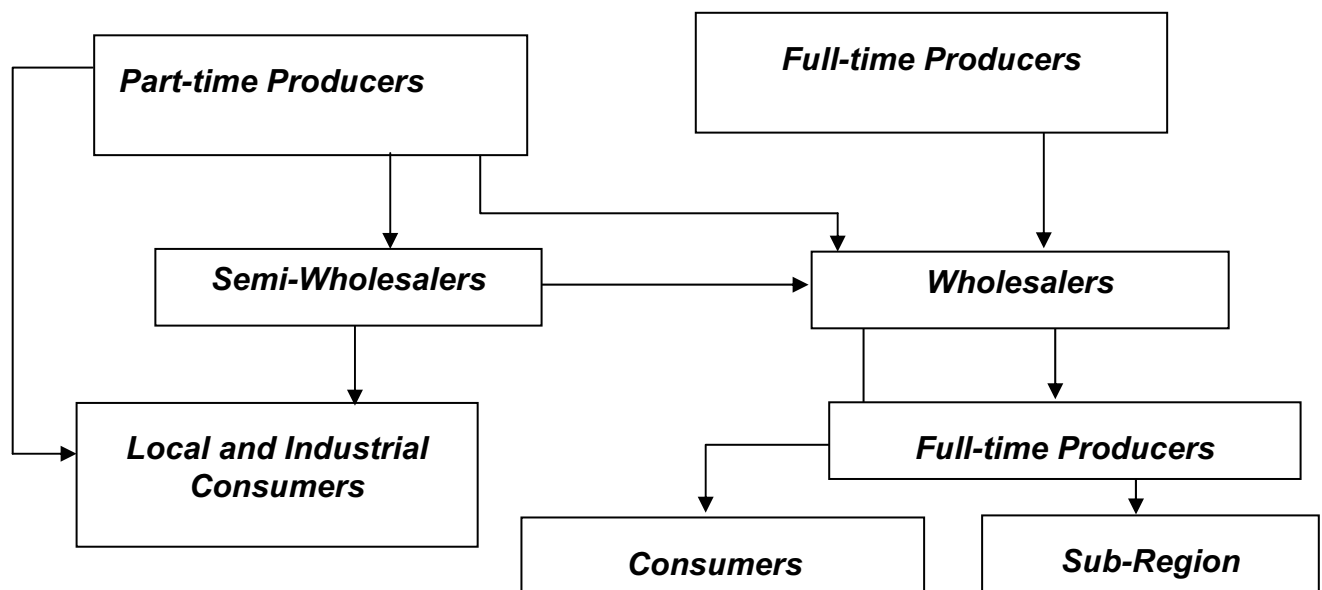
The stakeholders of the shea sector consist of 83 percent women (Ayemou, 1998) and of 17 percent men and others (see Diagram I).

DIAGRAM I: Circuit of marketing of the shea kernels (from: Ayemou, 1998)



The stakeholders of the sheanut sub-sector also intervene directly or indirectly in the shea butter sub-sector (see Diagram II).

DIAGRAM II: Circuit of shea butter marketing (from: Ayemou, 1998)



Market channels for sheanut

The prices negotiated between the collectors and the processors / producers fluctuates according to the law of supply and demand, and vary between buyers and between collectors, according to the quality of the product, and according to the distance the product must be transported. The prices vary between FCFA 25 F to 45 per kg.

In the rural areas, sheanut is regularly exchanged for kitchenware (basins, utensils, washbasins etc.), for spices (bouillon cubes, smoked fish, etc.), and sometimes for food (rice, yams, maize etc.). These barter exchanges are made according to units of measure (tins or cups), the price of which varies between FCFA 750 and 2 000, according to the size of the unit, and according to the quantity of the stock. However, the payment for the collectors and agents may be a commission paid according to a delivered quantity of kernels. The price between the wholesalers and the exporters varies between FCFA 80 and 115.

Market channels for shea butter

The rural women sell a large part of their shea butter to local consumers. They cut the butter into balls of FCFA 5, 10, 25, 50, and 100, according to the size of the ball. During

and following the harvest, the price negotiated between the processors and the collectors varies between FCFA 150 and 250, and very rarely reaches FCFA 300 per kilogram. As opposed to the rural women, the permanent full-time processors buy sheanut from the wholesalers. The price paid to the producer varies between FCFA 105 and 140 for a small cup of 7 kg, and between FCFA 125 and 150 for a big cup of 12 kg.

The price negotiated between processors and local consumers fluctuates according to the quality of the butter; it varies between FCFA 200 and 275 for the butter with water, and reaches between FCFA 300 and 500 for the higher-quality butter without water. The price of the butter bought by traders also varies according to the quality of the product. While the butter without water is valued between FCFA 350 and 600 per kg, the price per kg of butter with water varies between FCFA 225 and 350.

Problems encountered marketing of shea products

- The market for shea products remains vague because the sector is still badly organized; this results in price fluctuations which are considered unacceptable according to the wholesalers and the exporters.
- The prices negotiated between the collectors and the local populations are non-remunerative, and thus provide little incentive to address the factors which contribute to product quality.
- Shea kernels intended for marketing are mostly of mediocre quality, as compared to those retained for local consumption.
- Deterioration of stored sheanut causes enormous losses to the wholesalers (badly dried and poorly-stored kernels).

CONCLUSION AND PERSPECTIVES

The socioeconomic significance of the shea tree in the cultures of the rural populations of the regions where its presence is important cannot be over-emphasized. Even if the annual earning of a shea producer is difficult to quantify, the women of these regions recognize that the business of sheanut and shea butter and they constitutes for them the primary source of monetary income. It has been estimated that more than 2 000 women of the city of Korhogo alone live on the returns from the processing and sale of shea butter. It is estimated that between FCFA 850 000 and 10 000 000 may be earned by a storekeeper during a single shea marketing season.

To increase the prices obtained by the producers, it will be necessary to undertake further applied research on aspects of the quality of the product, which can contribute to an increased value and enhance the global market position of this important resource.

In order to respond effectively to the requirements of consumers, agronomic research should play an active part in the resolution of quality issues, by proposing simple techniques of drying, storage and processing of the product. Also, the genetic improvement and the selection of early- and high-yielding varieties could advance the domestication of the shea tree, despite naturally very slow growth and development, which may currently discourage farmers from investing their time and energy in conservation of the species.

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Production and Marketing of Shea Products at Ndélé, Central African Republic

Madam Flore Mamoun¹¹

ORGANIZATION AND LEGAL FRAMEWORK OF THE ASFMCA

The Solidarity Association of Muslim Women of the Central African Republic (ASFMCA) is a non-governmental, apolitical, confessional body, based on community participation in income-generating activities in order to fight against poverty. Active in the Central African Republic, the ASFMCA works to improve household living standards and the health of the individual by reinforcement and development of the value of traditional resources, notably the promotion of the Shea Butter tree, which is the main source of vegetable oil, followed by groundnut, in the region of Ndélé.

THE ASFMCA was established in 1999, and consists of 53 women as active members, among whom 11 constitute an Executive board. The appropriate resources to support the association are drawn from contributions of members which consist of a membership fee of FCFA 2 000, followed by a subscription of FCFA 1 000 francs per month.

The primary objective of the ASFMCA is to contribute to the mutual aid of its members during the social circumstances which are: births, marriage, bereavement, illness, and others. Secondly, the activities of the association are particularly centered on the promotion of the rural woman, who is most often left behind.

This relatively young association is placed under the sponsorship of the Association "Donaval Nature and Health".

BRIEF DESCRIPTION OF THE PARTNER (DONAVAL):

The Project (Medicinal Plants and Local Communities) of the NGO DONAVAL Donaval Nature and Health Association aims to promote the experiences, the competence and the know-how of traditional practitioners and local communities in the sustainable use and management of the environment, in particular the Non-Wood Forest Products (NWFPs).

The project aims to strengthen the institutional capacities of stakeholder communities by means of training and extension, education and communication. This work is situated on the one hand within the framework of the policy of the Central African government in environmental action, the fight against the poverty and the improvement of the living standards of the population, and on the other hand within the framework of the integration of national programs working toward amore sustainable and participatory development.

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The project emphasizes a strategy of promotion for the development of the non-governmental structures in the field of healing plants and local communities. The activities of the Association DONAVAL in the coordination and promotion of the ASFMCA include the promotion of the shea tree at Ndélé, the subject of our meeting here in Dakar.

DESCRIPTION OF SHEA SECTOR (NDELE):

The Prefecture of Bamingui-Bangoran consists of more than 32 800 inhabitants, and covers a surface of more than 58 200 sq km, situated in the Sudano-Sahelien zone, more than 664 km from Bangui, capital of the Central African Republic.

From an ecological and environmental perspective, The Prefecture of Bamingui-Bangoran abounds in enormous hunting, floral and mining potentials. The isolation of the town of Ndélé and the defective state of roads in this area of the country, effectively cuts off of the populations of this town every year during the rainy season. The women of Ndélé, the majority of whom are farmers, are confronted with difficulty in provisioning the most basic necessities (salt, oils, soap, etc.) and are burdened with unlimited duties: housework, maintenance of the family, cultivation, sale of the small items of commerce.

PROMOTION OF THE SHEA-TREE AT NDELE:

For ancient times, the shea butter has been produced by the population of this area for household consumption. The traditional production is done by roasting and is sold on local markets from time to time in bottles of 66 cl, at a price ranging from FCFA 250 to 300. This has been a partial, individual and disorganized level of marketing (2 to 3 bottles per woman); a sale out of necessity which did not bring more than 2 500 a day to the sales woman.

The creation of the ASFMCA allowed us to set up a chain of production, of improved processing and marketing of the shea butter at Ndélé. Starting with the purchase of a mechanical press, the roasting is now substituted by heating with steam, and the butter once obtained is filtered (by a coffee filter) in a sterilizer at 60 °C. These processes of production present multiple advantages, namely:

- reduction of labor, and in the working time of the women thanks to the press;
- increase of the quantity of butter produced (8 to 15 liters a day);
- improvement of the quality in the sale (a clean and whitish butter);
- improvement of the quantity in the sale (5 to 10 liters a day);
- increase in the value of the product, and price obtained: FCFA 1 000 to 1 500 per liter;
- an increase in the daily earnings from FCFA 5 000 to 15 000 CFA; and
- fair distribution and community use of a part of the profits.

This Dakar workshop, of which is the first of its kind, presents two peculiarities that I have the honor to point out here:

1. This workshop promotes an African traditional food product (shea butter).
2. The beneficiaries of this workshop are peasant, illiterate women.

If I may, on behalf of all the mothers of Africa, those of the Central African Republic, on behalf of the women of Ndélé in particular, whom I represent, I would like to thank deeply the FAO and the organizers of this meeting, which will probably have repercussions on the future of our resource - which is the shea tree - especially in the domains of its domestication, and its international marketing, which awaited by all the people of Ndélé.

I thank you.

Situation of the Shea Sector in Chad

Koumaro Mbayhoudel
ITRAD, N'Djaména

INTRODUCTION

At the heart of the African continent, Chad is situated in the intertropical zone between the 7 and 23 degrees of Latitude (North), 12 and 24 degrees of Longitude. The country covers a surface area of 1 284 000 square km. The demographic census of 1993, estimated the population at 6 288 000 inhabitants, unevenly distributed over the territory as a whole. With an annual growth rate of 2.6 percent, Chad should consist of 10 702 176 inhabitants by the year 2020. Chad is bordered to the North by Libya, to the East by Sudan, to the West by Niger and Nigeria, in the South by the Central African Republic and in the Southwest by Cameroon.

The country is subdivided into three agro-climatic zones:

- The Saharan zone, situated between **the latitudes 150 and 230** the North which covers a surface of 600 000 sq km and populated by about 73 185 inhabitants, with an annual precipitation of less than 100 mm. The only vegetation of this zone is limited to palm plantations in oases, and to the grasses which appear after the occasional rains. The dominant activities are the breeding of nomad camels, and extensive agriculture, especially date palms in the oases, which are depressions in which the water table lies a meter or less below the surface.
- The Sahelian zone situated between the **latitudes 110 and 150** the North covering a surface of 554 000 sq km, with about 3 292 586 inhabitants, and an annual precipitation of 100 to 600 mm. The natural vegetation is characterized by an herbaceous savanna and thorny steppe. Here are found transhumant, nomadic and sedentary farming systems. Two types of agriculture are practiced in this zone: an extensive rain-fed cultivation dominated by cereals, and an intensive agriculture in *wades* and around Lake Chad.
- The Sudanese zone is localized between the **latitudes 70 and 110** the North, with a small surface of 130 000 sq km, home to about 2 914 160 inhabitants. The climate is of the semi-humid tropical type. The annual precipitation varies from 600 to 1 200 mm, the vegetation extends from the savanna to the woody savanna. Soils are generally favorable to agriculture, and a variety of crops are cultivated extensively. It is in this zone in which is found the Shea Butter tree *Butyrospermum parkii* [syn. *Vitellaria paradoxa*], among other woodland species including *Parkia biglobosa*, *Daniela oliveri*, *Terminalia laxiflora*, etc.

PRODUCTION OF THE SHEA TREE

The geographic area of the shea tree extends across the five prefectures of the Sudanese zone (Mayo-Kebbi, Tandjilé, western and eastern Logones, and Moyen-Chari). The Ministry of the Environment and Water estimated in 1999 a total population of more than 82 million stems of the shea tree, unevenly distributed in these prefectures. Table 1 shows the estimated distribution of the shea stands by prefecture.

Prefecture	Surface (km. sq.)	Estimated Population
Moyen-Chari	48 000	34 000 000
Tandjilé	18 000	5 200 000
Logone Oriental	22 700	27 200 000
Logone Occidental	8 700	9 100 000
Mayo-Kebbi	30 100	7 300 000
Total	127 500	82 800 000

Source: MEE, 1999.

This table indicates that it is the region of Moyen-Chari that benefits most from the shea tree. A feasibility study of support for the shea sector in the southern zone by the Ministry of the Environment and Water (MEE) in 1999 found 1 217 shea trees in 99 random transects of 1 ha. It emerges that only 50 stems [4.1%] were from 1 to 12 years old. In Moyen Chari, a sample of 884 trees showed a rate of 2.6 percent juvenile. The high number of shea tree to Average Chari is due to the fact, that besides the natural populations of the trees, there were plantations established in 1929 in the villages of Bédjiondo and Péni. These planted trees are at present about 70 cm in diameter (DBH).

Thus, the shea tree benefited from some support at the beginning of the colonial era. Between 1950 and 1958, the Mutual Society of [Rural] Development (SMDR) supported the marketing of the shea products, in part through its compulsory plantation in certain villages and tracks of access to villages.

At the beginning of the independences, the Fund for Development and Rural Action (FDAR) tried to organize the shea sector before handing over to an Italian project (the "shea project"), which was active from 1974 to 1978. The objective of this project, which covered the entire zone of production, was the popularization of the new techniques of drying sheanut in ovens, and techniques of shelling and processing of nuts.

At present, the NGOs and the convent schools of the zone lead activities of support for the mostly women's groups which are engaged in shea production.

The activities involve, among others, the transformation of nuts to butter:

- The *Bureau d'Etude et de Liaison des Actions Caritatives et de Développement* (BELACD), based at Sarh in Moyen-Chari, and at Moundou in Logone Occidental, sensitizes and supports more than 200 women who transform the sheanut into butter for alimentary use, and as a base for the making of soap.
- The Association for the Promotion of the African Community Initiatives (APICA), also based at Sarh, has trained and supported about 300 women in the field of the transformation of the shea butter into soap and in cosmetic products.
- In the same city, the Association for the Promotion of Agro-Pastoral Initiatives (APIA) assists in the collection and the processing of sheanut.

USES OF THE SHEA TREE

In the Chad, shea is a multi-purpose tree; therefore, it benefits from a certain protection with regard to the other trees:

- Leaves are used in certain cultural ceremonies, such as to take an oath in the traditional courts.
- The very fragrant flowers, are used as an herbal tea, and sometimes to treat asthma.
- Nuts are used to soothe an itch.
- The bark of the tree is used in infusion is used to treat oxyures.
- Its oil or its butter has numerous uses, viz.:
 - alimentary usage
 - pediatric use (massage of the newborn)
 - care of the nasal bleeding
 - gastric dressing of alcoholics
 - care of rheumatism
 - healing of wounds
 - treatment of ringworm on the body of horses
- Nut residues are used against termites, and sometimes as source of fuel to cook food.
- The [termite-resistant] wood is used in framing, in carpentry and sometimes to burn bricks.

MARKETING

Since the beginning [of the colonial era], several attempts at structured marketing of the nuts and butter of the shea tree have been undertaken. It was thus that the Mutual Society of Rural Development (SMDR) took charge of the marketing of the shea butter between 1950 and 1958 followed by the Fund for Development and Rural Action (FDAR), which exported the butter from Chad to the IRANEX Company in Rouen (France). However, from 1965 began a decline of production, which continued and became more marked from 1970 to 1978, leading to an annual export which has not exceeded 300 tons of butter.

In 1976, the Italian project bought 22 tons of sheanut from the farmers at the rate FCFA 15 per kilogram, then sold the nuts to the Cotton Society of Chad (Cotontchad), which in turn extracted from it the butter at the Moundou oil-works, to be resold at FCFA 250 per liter.

In 1977, the project bought 120 tons to sell them to the Society. Regrettably, the absurdly low price of nuts discouraged the collectors - and, on top of this, the quality of the butter was not to the taste of the consumers. In fact, the Chadian consumer tends to prefer a “black” butter with strong smell, in contrast to the clear, deodorized butter produced by Cotontchad.

In 1982, a storekeeper in the region of Moyen-Chari was interested in the marketing of kernels, but he was quickly discouraged from the trade, turning instead to the more lucrative enterprise of gum arabic.

For the moment, there are no further supports, at the level of the State or the private sector, to the marketing of the shea products; the collectors of nuts and the processors must organize themselves. It is estimated that a collection of about 30 to 160 kg of dried sheanut is made by each collector during the annual harvest. Each bag of about 90 kg of sheanut is valued at between FCFA 6 000 to 8 000 according to the season and the location.

In the Chad, if one assumes that during any given year about 40 percent of the total population bears fruit, and that each productive tree yields on average about 3 kg dried shea kernels, this would indicate an annual harvest of about 100 000 tons of sheanut a year, at an estimated value of FCFA 8 billion [about US\$ 15 000 000].

In 1999, a study on the artisanal processing units at Sarh indicated that about 225 tons of nut were transformed into commercial butter which brought to the collectors more than FCFA 20 million [about US\$ 40 000] (Mbayhoudel K. and Goalbaye, 1999).

In Chad, the price of nut varies from a village to another, from an analysis of more than 80 markets where the nuts are sold, the price was found to range from FCFA 200 to 300 FCFA the *coro* (a measure of about 2.5 kg) during the month of October [when stocks are most abundant].

As for the butter, from Sarh to N'Djaména the price fully doubles. From March in May [the time of maximum scarcity] prices range between FCFA 1 200 in 1 500 FCFA in N'Djaména, as compared to about FCFA 700 during August - September.

CONSTRAINTS ON THE SHEA SECTOR

In spite of its considerable potential, the shea sector is confronted with several constraints:

- While the sector once benefited from technical and financial support before and at the beginning of Independence, it has been completely abandoned nowadays by the State and all of support structures.
- Compounding this lack of technical support, the tree is infested by insects (*cicadelles*) and with parasites (mistletoes), which considerably reduce its productivity.
- The women who devote their time and labor to the collection and the processing of nuts are not conversant with adequate methods of storage and appropriate methods of extraction of the oil.
- With increasing demographic pressure, the tree is often used as a mere source of energy.

CONCLUSION

Appropriate support for the shea sector could not only facilitate the struggle against poverty - especially for women in the rural areas - but could also assist greatly in the fight against the desertification. The reinforcement and development of the potential value of natural products such as those of the shea tree is one of the most important means of sustainable management of natural resources.

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Conservation of the Shea Tree Parklands of the Nigerian Humid Savanna through local Resources Management

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ABSTRACT

Parklands provide a resource management system that associate agricultural cropping practices, forestry plantations and/or pastoralism to ensure ecological as well as economic interaction between trees and other components of the environment. Shea tree (*Vitellaria paradoxa* Gaertn. F.) is the most essential tree crop in the savanna because of its drought/fire resistance and multipurpose values. It is the most dominant woody component in the various agro forestry practices in the Nigerian humid savanna vegetation zone, an area that accounts for up to 45 percent of the Nigerian land area. The plant is encountered in this zone as a result of protection that varies among agro-zones as efforts at domestication is at the lowest ebb. The density of the plant in the natural habitat varies between 3.8 stands/ha. in the southerly growing areas and 8.7 stands/ha. in the northerly growing areas. The plant is presently endangered because of poor natural regeneration, low sapling stock in the vegetation, and preferential utilization of mature trees for timber, fuel, constructions, charcoal production and carvings. Establishment of commodity utilization association, organized plantations, provision of improved planting stock, pruning, fabrication of prototype machine and establishment of alternative source of fuel are suggested as management strategies to salvage the plant from extinction.

Key words: Domestication, endangered species, plantation, regeneration, *Vitellaria*.

INTRODUCTION

The Nigerian Savanna, an expanse that constitutes 80 percent of Nigerian total land area (Oguntoyinbo and Oguntala, 1980), is made of derived savanna, southern Guinea, northern Guinea, Sudan and Sahel savanna vegetation types (Keay, 1949). The major land uses in the savanna include natural rangeland, plantation woodland, ranches, and reservations including game parks and parklands, and agriculture, mostly subsistence. The fertility of the soil in the savanna is maintained by shifting farming system. However, due to intense pressure on available arable land as a result of soaring population, the long fallow could no longer be afforded. Agro forestry parklands provide a contemporary management system to maintain the quality of the environment and increase production per unit area. Agro forestry parklands are land use systems in which woody perennials are deliberately preserved in association with crops and/or animals in a

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spatially dispersed arrangement and where there is both ecological and economic interaction between trees and other components of the system (Bonkougou *et al.*, 1994). Besse (2000) described parklands as a system of production and valuation of agro-forested resources particularly adapted to the local economy. He further asserted that parklands, as a well-balanced management of different resources in the same location by the people, associate agricultural cropping practices, ligneous and non-ligneous forestry productions and sometimes pastoralism.

The tree component of the Nigerian parkland savanna include *Vitellaria paradoxa*, *Parkia biglobosa*, *Prosopis africana*, *Moringa oleifera*, *Jatropha curcas*, *Adansonia digitata*, *Tamarindus indica*, *Vitex doniana*, *Azelia africana*, etc (Awodoyin, 1997; Popoola and Tee, 2001). Most of the trees have multipurpose uses (Table 1). Overall assessment of the priority tree in the savanna showed that *Vitellaria paradoxa* (shea butter tree) is most dominant in the savanna because of its drought/fire resistance and multipurpose values. *V. paradoxa* offers as many uses in the savanna as oil palm tree (*Elaeis guineensis*) offers in the forest vegetation zone of Nigeria (Awodoyin, 1997). It ranked the most important tree component in the Savanna parklands in Uganda (Nkuutu, 2000). In the series of surveys conducted in the Nigerian savanna *V. paradoxa* ranked the most essential tree component in the agroforestry parklands (Popoola and Tee, 2001).

DISTRIBUTION IN NIGERIA

V. paradoxa is locally abundant on poor soils in the derived and guinea savanna vegetation zones, most especially near towns and villages (Irvine, 1961). In West Africa, the distribution extends from East of Senegal across Southern Mali and Burkina Faso, Northern Guinea Bissau, Guinea, Sierra Leone, Cote d'Ivoire, Ghana and Togo, Central Benin Republic and Nigeria, North East Cameroon and Southern Chad. In Nigeria, as revealed by herbarium specimens, the plant occurs in the derived savanna (moist and dry woodland) and guinea savanna, an expanse that constitutes about 45 percent of the Nigeria's land area. The plant is also sparingly encountered in the southern boundary of the Sudan savanna, in Southern Kano and South Eastern Sokoto States. In these areas the plant is encountered as part of various Agroforestry practices including shifting cultivation, silvo-pastoral, agrosilvopastoral, Taungya and Social forestry systems (Popoola and Tee, 2001).

V. paradoxa is encountered in all the ecosystems as a result of large scale protection as efforts at propagation and other domestication activities are still at lowest level. Wild animals, mostly primates that relish the sweet fruit pulp, carry out dispersal of the seeds. The intensive utilisation of the seeds, which is the propagation unit, in butter and confectionery production may constitute a bottleneck in the domestication effort.

POPULATION STRUCTURE

In Nigeria, the stocking density of *Vitellaria paradoxa* averaged 7.8 stands/ha and 9.0 stands/ha in the cultivated and fallow land uses respectively. In the Southernly derived savanna area *Vitellaria* stands are selectively cut back to reduce the canopy and thus reduce the shade overcast in cultivated land use. Also in the area, the tree is utilised for timber, charcoal and mortar/pestle production, and fetish carvings. The density of the plant increased progressively from the South to the northern growing areas in Nigeria. The mean densities in the moist woodland (Lanlate/Igangan/Ogbomoshos), dry woodland

(Saki/Ilorin) and southern guinea savanna were 3.8, 4.3 and 8.7 stands/ha respectively. In the moist and dry woodland savanna, some stands of *Elaeis guineensis* are encountered. This provides an alternative source of vegetable oil to shea butter. Also because of high concentration of human population in the region, there is intense pressure on land for agriculture, industry and other developmental programmes. These result in wanton destruction of trees, including *V. paradoxa*, for construction and utilization as fuel. In the southerly areas, the stands of *V. paradoxa* are taken care of along with the food crops on cultivated land use. Once the food crops are harvested less concern is given to the trees, thus exposing the stands to fire hazards during out-of-season dry periods. However, in the northerly areas, because there is no alternative to shea butter as source of vegetable oil, the tree stands are better protected. Also the tree tenure system is freehold within a community. This encourages communal care, often given by aged women and their wards, for the trees.

In a study that compared the density of *V. paradoxa* to that of *Parkia biglobosa*, another important savanna agroforestry parkland tree, the result revealed a *Vitellaria*:*Parkia* stand ratio that averaged 1:1.2 in the southerly moist woodland savanna, 1:1 in the mid zone dry woodland and 1:0.5 in the northerly southern guinea savanna (Table 2). Also with respect to land use types, the stand ratio were 1:1 and 1:0.6 for cultivated and fallow land uses respectively. These results imply that there were more stands of *V. paradoxa* in the northerly area than in the southerly area. That is, while *V. paradoxa* is better protected in the northerly area, *P. biglobosa* is better protected in the southerly area. It is also clear during the field survey that palm oil provides alternative to shea butter in the south while *Prosopis africana*, another multipurpose tree utilised in the production of local condiment, provides alternative to *Parkia biglobosa* in the north. The low preponderance of *V. paradoxa* in the cultivated land use may be attributed to the destruction of trees for agronomic crops.

In the study of population structure, size class distributions showed that saplings (<51cm GBH) of *V. paradoxa* were absent in the dry woodland zone and relatively low in the moist woodland and southern guinea savanna (Figure 1). The number of saplings was relatively higher in the cultivated land use than fallow land use. In Southerly moist woodland savanna ecozone, large trees (>168cm GBH) of *Vitellaria* were absent in the vegetation, either in the cultivated or fallow land uses. *Vitellaria* are not particularly protected in this zone because of its low product value (probably owing to the oil-palm substitute), urban demand for charcoal, preferential utilization for fuel (owing to its high calorific value), and removal for farming activities. Conversely, large trees of *Vitellaria* were encountered in the dry woodland and Southern Guinea Savanna ecozones, accounting for 15.4 percent and 13.5 percent of the stand populations respectively. The large trees (>168cm GBH) of *Vitellaria* were more abundant in the cultivated than in the fallow land use, especially in the Northerly area. The pooled relative abundance values for the large trees of *Vitellaria* in the cultivated and fallow land uses were 20 percent and 4 percent respectively (Table 3).

The population structure study showed that conservation of *V. paradoxa* is desirable in Nigeria because of the low species replacement and poor regeneration. The almost lack of large trees (>168cm GBH) in the southerly areas may indicate that *V. paradoxa* is more threatened in the area. The declining numbers of large mature trees, low same-species

replacement (poor natural regeneration) and utilization of seeds for vegetable oil have negative effects on regeneration and production of the species in Nigeria.

CONSERVATION

The degree of conservation enjoyed by sheatree varies among communities based on ethno-preferences for the plant and its products. Presently there are no concerted efforts at propagation and organized plantation management. In the southerly growing zone, stands are protected on the preference of the farmer on whose farm the trees stand. Whereas, in the northerly area, it is almost forbidden to cut a stand of *V. paradoxa* for any reason. The enforcement of this legislation is the responsibility of the village heads. These wild stands are well cared for in the northerly area, whereas the care is limited in the southerly area. In the dry woodland zone, the herdsman lop branches of shea trees to feed their livestock in the dry season when pasture and fodder are scarce. Efforts made by the various States Agricultural Development Projects in the areas at transplanting the seedlings and establishing orchards of *V. paradoxa* were attended with little success.

NATURAL REGENERATION/ADVANCE GROWTH

Species dynamics in most natural ecosystems is sustained by ingrowths through natural regeneration. Thus natural regeneration/ Advance growth constitutes a veritable stage at which concerted efforts should be directed in order to ensure the conservation of *V. paradoxa* in Nigeria.

Ordinarily, the conservation of *V. paradoxa* in some parts of country would have been guaranteed by the Northern Nigeria New Forestry law (Cap 44) of 1963, which listed the species as one of the protected forest tree species in the region. Unfortunately, the intent of the law has not been achieved at the natural regeneration/ advance growth stage where the species suffers high mortality owing to a combination of several factors. For instance, in most parts of the ecological range of *V. paradoxa* in Nigeria, the annual rainfall ranges from 900-1400mm with irregular distribution and about 5-7 months of dry season (Oni *et al.*, 1999). Coupled with a huge amount of fuel load especially during the dry period, the natural regeneration and Advance growth are burnt during the incessant annual fires.

The situation is further compounded by poor law enforcement in respect of bush burning and the habitual practice of the *Fulani* herdsman who burn the bush in order to encourage fresh grass flush for their cattle during the dry season. Studies have shown that intense bush fires adversely affect flowering/fruitletting in particular savanna species (Hall *et al.*, 1996; Adegbola and Oni, 2000). Field observations show that *V. paradoxa* flowers in the dry season (Odebiyi *et al.*, 2001). This phenological trait predisposes the species to impaired flowering/fruitletting consequent upon intense bush fires. This subsequently impacts negatively on available propagules for natural regeneration. Another important factor is that pastoralism in Nigeria is largely nomadic and based on free range. The common experience is that both cattle and wildlife browse the natural regeneration and Advance growth of *V. paradoxa* during the dry season because of inadequate fodder availability. This reduces the population that reaches the sapling or pole stage.

In order to successfully manage the natural regeneration and Advance growth stage, there is need for an in-depth understanding of the interactions of these factors. Fire protection

must be ensured while wanton destruction of the natural regeneration of the species during site preparation for farming should be checked. Farmers often claim inability to identify species at the seedling stage. Appropriate measures should be put in place for the enforcement of the relevant laws, which prohibit the undue decimation of this species at the natural regeneration and Advance growth stage. Further more, adequate information is essential on the domestic/wildlife population and the carrying capacity of our rangelands, which provide good sources of *V. paradoxa* in the country.

Effective fire prevention and control are very crucial for the conservation of the species at the natural regeneration / Advance growth stage. Experience in some parts of the tropics has shown that where natural regeneration is inherently deficient, an enrichment of the seed-bank is routinely carried out in addition to fire and pest control.

SAPLINGS AND POLES

The wood of *V. paradoxa* has many properties including high density, resistance to pests and diseases and high calorific value. These properties have made *V. paradoxa* a choice species, for fuel wood/charcoal production as well as the carving of dug-out boats, mortars and pestle. The sapling and pole stages are most vulnerable especially for fuel wood/charcoal production and carving of pestles. Forest exploitation and timber extraction in all the northern states of Nigeria are broadly governed by sections 50-60 of the Northern Nigeria New Forestry law (Chapter 44) of 1963 with current state modifications in edicts. Under the subsisting regulation, the extraction of a forest produce from the forest reserve or “free area” must be authorized. Unfortunately, the extraction of saplings and poles is mostly carried out without recourse to appropriate government regulations. This often has resulted in over-exploitation of the species with adverse implications for its conservation. *V. paradoxa* is averagely fire-tolerant at the sapling and pole stages. However, the level of tolerance is drastically reduced by the intensity, frequency and duration of bush fires. It is imperative that appropriate strategies are put in place for the management of the sapling and pole stages of *V. paradoxa* in the savanna areas of Nigeria. Such strategies may include fire protection of natural populations of species, controlled exploitation and the adoption of simple silvicultural techniques for managing natural clusters of the species. Field observations have shown that *V. paradoxa* stands on good sites start fruiting at the late pole stage. Adequate fruit production may be enhanced through appropriate thinning where there are clusters. The conservation of the species could also be achieved through the cultivation of the savanna and the retention/protection of the saplings and poles of the species on such farms.

MATURE STANDS

The management of mature trees of *V. paradoxa* may be influenced by several factors, which include: tree morphology, phytosociology as well as the prevailing environmental factors and the farming practices in the savanna areas of the country. Essentially the overall objective in the sheatree conservation is to achieve stands with high vigour, healthy and very productive trees in terms of fruits production. In order to achieve this objective, desirable management practices such as pruning of selected branches may be carried out. Such branches may include the less vigorous or infested ones as well as stands with visible damage caused by fire. Pruning or branch cutting and complete removal of stands encourage coppice re-growth, which may result in more fruiting in the

following season. Where multiple coppice shoots are observed after pruning, thinning should be employed to favour the growth of a single main stem. The latter is then pruned and possibly staked to encourage upright growth.

Where the crown appears too broad and could depress the yield of associated food crops, the size may be reduced by pollarding. It has been reported that effective practice of this cultural method enhances improved fruit production in the following fruiting season. Occasionally where several mature stands occur in high density, selective cutting may be carried out to prevent undue inter-tree competition or the depression of food crops yield. However care must be taken not to cut down plus trees. Mature trees of shea trees are commonly used in the carving of dug-out boats, mortars and pestle; hence care must be taken not to cut down plus-trees for some domestic uses which have transient income value. Possible benefits of judicious pruning include improved fruit production through development of new growth, reduction of the shading effect on crops by altering crown shape; increased root sucker development and greater productive life span (Kessler & Boni, 1991).

On general basis the sheatree parklands may be conserved by protecting the naturally regenerated stands to enrich ageing parklands, thus avoiding the burden of supplying new seedlings and the problem of planting out. The introduction of improved fallows whereby mixtures of grasses and legumes are planted to restore soil fertility along with controlled grazing and annual bush burning on the parklands could help the process of conservation. However, a major factor to encourage more deliberate protection of the parklands will be the introduction of elite lines of sheatree which are fast growing, early maturing and with heavy fruit/nuts. This will bring the tree into the main farming practices and the tree would be seen more as a plantation tree crop rather than wild fruit trees. According to Kessler (1992) farmers are reluctant to plant several multipurpose trees not because they do not know the value of the tree but because they are not sure of reaping the benefits in their lifetime.

CONCLUSION

Conservation of the sheatree parklands through local resource management is critical in the overall sustenance of the rural economy. Various workers have indicated the roles of the resource in the rural economy in terms of food, income, fuel wood supply foreign exchange earnings and employment opportunities. However increasing pressure on lands coupled with desertification, deforestation and sand dunes movement are all evidence of increased pressure on the parklands, which are threatening the remaining gene pool of the resource. The need for direct intervention using some of the options mentioned above is required for the continuous availability of the resource and the conservation of the parklands. The need for more direct intervention especially in the area of genetic engineering and the application of biotechnology are desirable towards the development of improved seedlings with relevant traits. To complement the survival of these improved seedlings there would be need to train farmers in various aspects of traditional silviculture. Lastly more researchers and farmers participatory activities will also favour shear butter parklands conservation. The farmers are the primary stakeholders hence should be encouraged and effectively involved the overall process of parklands conservation.

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Table 1: Some indigenous fruit trees on farms and fallows in Nigerian Humid Savanna and their uses

Species	Uses
<i>Vitellaria paradoxa</i>	Vegetable oil, medicine, charcoal, confectionery, cash, shade.
<i>Parkia biglobosa</i>	Condiment, cash, medicine, shade, timber, fuel wood, drink, carvings.
<i>Adansonia digitata</i>	Vegetable, fruit drink, fetish worship, medicine.
<i>Termarindus indica</i>	Fruit drink, cash shade, fodder.
<i>Moringa oleifera</i>	Vegetable, oil, water treatment, fuel wood medicine.
<i>Prosopis africana</i>	Food, cash, medicine, fuel.
<i>Vitex doniana</i>	Medicine, fruit drink, ink, fodder, cash.

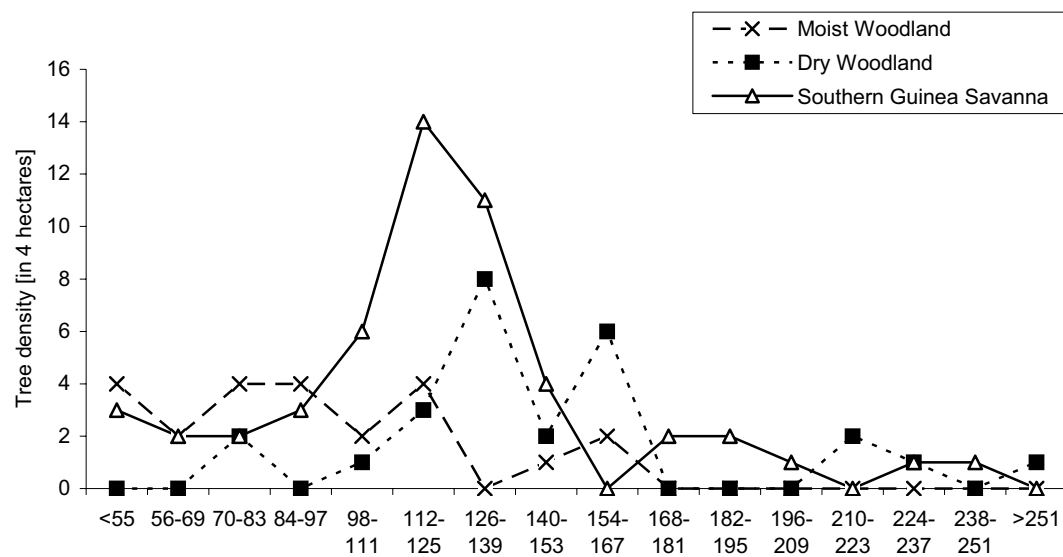
Table 2: Vitellaria: Parkia stand ratio in the Nigerian humid savanna

Ecozones	Study Location	Latitude (N)	Longitude (E)	Land Use	<i>Vitellaria: Parkia</i> Stand ratio
Moist Woodland	Lanlate/Igangan	7°36’	3°24’	Cultivated	1:2.4
				Fallow	1:0.8
Savanna	Ogbomosho	8°08’	4°14’	Cultivated	1:2
				Fallow	1:0.7
Moist Woodland	Saki	8°41’	3°23’	Cultivated	1:1
				Fallow	1:0.6
Savanna	Ilorin	8°30’	4°32’	Cultivated	1:1.5
				Fallow	1:1
Southern Guinea	Mokwa	9°18’	5°04’	Cultivated	1:0.7
				Fallow	1:0.3
Savanna	Kontagora	10°24’	5°29’	Cultivated	1:0.6
				Fallow	1:0.6
Total (Ecozone)					
Moist Woodland Savanna		-	-	-	1:1.2
Dry woodland Savanna		-	-	-	1:1
Southern Guinea Savanna		-	-	-	1:0.5
Total (Land Use)					
Cultivated		-	-	-	1:1
Fallow		-	-	-	1:0.6
Total (Nigerian humid Savanna)			-	-	1:0.8

Table 3: Distribution of trees of *Vitellaria paradoxa* in various girth size classes in the land uses (pooled for 6 hectares) in the Nigerian humid savanna
Percent relative abundance in parentheses

Girth Size Classes GBH(cm)	Cultivated	Fallow
<55	6 (14)	1 (2)
56-69	3 (7)	1 (2)
70-83	2 (5)	6 (11)
84-97	3 (7)	4 (7)
98-111	2 (5)	7 (12)
112-125	4 (9)	17 (30)
126-139	10 (23)	9 (16)
140-153	2 (5)	5 (9)
154-167	3 (7)	5 (9)
168-181	1 (2)	1 (2)
182-195	2 (5)	0
196-209	1 (2)	0
210-223	1 (2)	1 (2)
224-237	2 (5)	0
238-251	1 (2)	0
>251	1 (2)	0

Figure 1: Population structure of *Vitellaria paradoxa* in three agroecological zones in the Nigerian humid savanna



Overview of the intervention of PROMER in the Shea Sector in the Département de Kédougou, Senegal

**Amadou Souare
PROMER**

THE SHEA SECTOR IN THE DEPARTMENT OF KÉDOUGOU: TO LEAVE THE BEATEN PATH

The main part of the populations of the shea tree in Senegal is concentrated in the Department of Kédougou, in the southeast of the country. In spite of the various limiting factors (irregularity of the precipitation, parasitism, bush-fire) the park is considerable and its development potential important. Shea butter is the main product obtained by the exploitation of the tree, the production of which is assured mainly by women, through a long and tiresome process conducted with rustic equipment. In spite of the relatively poor yield from the traditional extraction process (on the order of 20%), significant quantities of shea butter are produced for the household consumption and commerce, localized at the level of the zones of production due to limitations of transport and market access. The intervention of PROMER in the sector has been directed primarily toward organization of the producers, increased production, improvement of product quality and packaging, and support for the marketing of shea butter on urban markets. The results of PROMER's interventions in these various domains are rather encouraging, but further issues remain to be addressed.

I. INTRODUCTION

The populations

"The ecological requirements of the shea-butter tree (*Butyrospermum parkii*) are such that one finds it in Senegal only in the Department of Kédougou (Region of Tambacounda) in variable densities". It is in these terms that the study conducted for PROMER in 1999 (by Baba Ba, Engineer of water and forests) in three sites situated in the districts of Saraya and Salémata, presents the situation of the shea tree in Senegal. This study, which covered an area of 27 142 hectares, estimated the parkland at 868 544 stems within the zone, at average densities of 11 to 32 stems per hectare. At the level of composition, the observed population was characterized by a downward linearity, with 37 percent young shoots (natural regeneration), 34 percent immature trees, 27 percent mature trees and 2 percent old trees for Salémata. The population of Saraya offered the same profiles with, however, a lower occurrence of immature trees. The analysis of these characteristics shows a greater current potential of production for Saraya, but a reversal of this tendency for the benefit of Salémata in about twenty years time. The preservation of this important current and future potential is not however completely guaranteed. Indeed, besides the irregularity of the precipitation which seems to have serious repercussions on the fruiting, parasitism and bush-fires constitute serious threats to productivity and regeneration of the shea tree.

Threats to the tree (parasitism, bush-fire)

Two parasites were identified in the site of the study, but the damage which they cause to the tree is much less important than the foliar damage caused by insects. However, their attacks at the level of trees leave more evidence than the foliar damage, the effects of which are more evident on the young shoots of the natural regeneration and the immature trees. The damage caused to the tree by plant and insect parasites is slight, however, compared to that from bush-fire and drought. These can interfere with fruiting and in some cases cause the immediate death of the tree.

However important they may be, these threats are still far from putting in danger the development of the parkland. This is at present an area of concern for local people, notably in the framework of the production of shea butter.

The stakeholders and production

The women are almost the only stakeholders engaged in production of shea butter. They are present from the beginning to the end of the chain, that is from the collection of ripe fruits to the marketing of the butter. However, in Saraya district, there is a stage reserved for the men; this is the packaging of the butter in leaves of the indigenous tree *Cola cordifolia*. This traditional packaging is comparable to the simple instruments used in traditional extraction of the butter.

The working materials

The producers of shea butter have no infrastructures intended exclusively for their work. They practice outdoors and use occasionally the shelters which serve as kitchens. Also, the implements which they use in processing consist essentially of kitchen tools and equipment. These items include:

- mortar and pestle, winnowing basket, sieve, basin, bowl;
- pot, big wooden spoon;
- forked stick for stirring;
- flat stone and a roasted nut from the *Borassus* palm (for grinding).

From the beginning to the end, all the work of extraction is done by hand, using these simple implements.

The collection of fruits

The work begins with the collection of fruits of shea tree which, once ripe, become loose and drop from the tree by the action of the wind, rain or birds - or simply as a result of their own weight - and fall around the base of the tree. One also finds nuts at feet of other trees which shelter many birds, having been transported by them to their nests in order to consume them in peace, and maybe also to feed their offspring. Having satisfied their hunger with the fruit pulp, birds drop the nut, which does not of course interest them as it does the women.

To collect fruits and nuts, women get up very early in the morning and make a tour of the trees. They may also go to collect during the day just after a strong wind or a strong rain. The distance to be covered depends on the density of the stands and their proximity to the village. Very often, if the collectors are many, women are obliged to venture every day a little further into the woodland. They can thus cover daily distances of up to ten kilometers. Once on the scene, they rummage around the base and in the immediate surroundings of trees with their hands and feet, or by means of a stick. This exposes them to grazes or to bites of snakes, which seem to be attracted by the strong scent exuded by the fruit.

The return journey is always more tiring as it is made with the collected fruits carried on the head. To avoid the risks connected to the collection and the fatigue caused by the walk, certain women are content to knock fruits down from trees by means of a pole. Fruits so harvested are unripe, and thus yield a poor quality butter. The product of the harvest may be piled up for several days inside the homestead, remaining there so that the children and even the adults can delight in the delicious pulp. The part of the pulp which remains uneaten by people will fall to the innumerable small insects which scuttle about the fruit heaps during the course of the day. In the end, the women obtain almost bare nuts and can begin the process of transformation from nuts to the production of the butter.

The first act of the process consists in parboiling the nuts of in big pots containing some water and put on a traditional hearth. This action facilitates the removal of the kernel from the shell, and also prevents germination of the kernel. The parboiled nuts are then dried in the sun. When they have completely dried, the women break the shell with a stone to free the kernel. The fragments of shell are discarded. Kernels are at this stage ready for transformation into butter. They can be also stored in big baskets or in sacks on the floor, to be used after the harvest. Kernels so kept can be used until the next harvest. However, the longer the storage time, the greater the risk of degradation of the kernels. Humidity, which favors the development of fungi on the kernels, is the most significant factor in this degradation. Kernels so infected have a very poor yield and give a poor quality butter. The process of transformation from the kernel to shea butter is long.

The process of extraction

If extraction is done using stored kernels, these should be softened beforehand. For this the kernels are soaked in water for four hours or treated with steam by means of a steamer put on a pot of boiling water. If, on the other hand, the kernels are freshly boiled and dried, they are processed directly. In both cases, nuts follow then the same process:

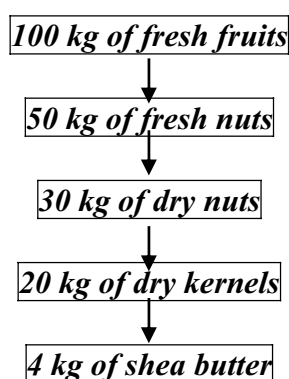
1. Reduction of kernels into powder by pounding.
2. Drying of the powder in the sun.
3. Roasting the dried powder.
4. Pounding the dried flour softened with a little water.
5. Reduction of the product into dough by grinding.
6. Manual kneading of the dough in some water to obtain a foamy paste, from which a whitish exudates forms on the surface.
7. Extraction is followed by washing of the foamy paste several (5-6) times.

8. Cooking (without water) of the foamy paste until obtaining of a butter of yellowish color.
9. Straining of the butter in a sieve to clear it of residues and other impurities.

For the women of Salémata, the process of transformation stops there. The product is then kept in plastic bottles or in bowls. For the women of Saraya, it is again necessary to beat the butter to the liquid state until it becomes more solid. It is then necessary to let the product sit so that it hardens, and to package it in the shape of fan-shaped blocks of more than a kilogram. Finally, each block of butter is packed in leaves of *Cola cordifolia*, and fastened with fibers from the same tree. The stages which comprise the process of transformation are tiresome, and their application requires a lot of muscular energy. Nevertheless, in spite of the arduous nature of the work, the yields from processing are not high.

The returns, productivity and production

According to a study conducted by PROMER at Saraya in December 1998, the yield by the traditional process which we have just described is no more than 20 percent. That is, for 20 kilograms of kernels one obtains only 4 kilograms of shea butter. These 20 kg of almonds represent about 100 kilograms of fresh shea fruit. (Cf. plan below).



According to the study, to obtain these 04 kilograms of butter will require 29 hours of actual work for a single woman. This calculation does not include the time required for collection of fruits to obtain the kernels, which is at least five days, depending on the quantity of fruits collected.

To ease the work, the women often help each other in the most difficult operations of the process (particularly pounding and grinding). Their individual production capacity is then between 3 and 4 liters a day. But in actuality, they rarely produce more than 20 liters per woman during the first two months following the harvest, during which time most production takes place. Indeed, during this season of high agricultural labor demands, they can dedicate at most only one day a week to processing the collected fruits.

In light of the above considerations, the conclusion one may reach is that shea butter production is very weak in relative value. But if one takes into account the fact that in the villages of the shea zone, almost all the women put a lot into the production of the butter, the conclusion will be otherwise. Indeed, one can then speak about a significance in *absolute* value from this production. But however great the actual production, it is much weaker than the (potential) productive capacity of the shea stands, which the PROMER

study estimates at 6.25 tons of butter a year for the rural community of Saraya alone. If one applies this figure to the 9 other rural communities of Kédougou department, one finds a production capacity of some 56.25 tons for the department as a whole.

Seen in terms of its potential, the production is sufficient to constitute (and maintain) a viable commercial activity. However, another important consideration is that an important part of the production is intended for the household consumption; the business of shea processing is thus particularly important at the local level. In addition to the consumption and marketing of shea butter, treated kernels also constitute an important item of commerce.

Marketing of sheanut and shea butter

In the zone of Saraya where there is no weekly market, the products of the shea tree are generally sold at home. But in Salémata and in the other districts of Kédougou, *loumas* (rural markets) constitute the real centers of marketing for these products. The women go to the *louma* on foot, carrying on their heads the products intended for sale.

For kernels, the buyers are the processors, women who for one reason or another were not able or chose not to face the rigors of collecting of fruits, depulping and shelling. The prices applicable for the equivalent of a kilogram of dried sheanut seem to be conversely proportional to the distance between the point of sale and the town of Kédougou. Thus, prices range from FCFA 100/kg for villages as distant as Mako; FCFA 150/kg for the neighboring villages of Kédougou such as Itato, Ibel or Bandafassi. In Kédougou itself, the kilo is sold for FCFA 200. Saraya, however, constitutes an exception to the rule, as a kilogram of kernels does not bring less than FCFA 250.

The butter reaches a wider clientele; they are in descending order:

- The salesmen of fritters (*beignets*) who live in the zone.
- Local households (for consumption).
- Traders from Kédougou or from cities of the North of the country.
- Individuals passing through the zones of production.

As the latter two categories buy unimportant quantities, one can say that the local customers constitute the main part of the consumers. They can buy the butter for cash, on credit and even on terms of barter (in which case the goods offered in return are essentially basic foodstuffs).

The prices applied to the sale differ according to villages, periods and units of measure. In Salémata, the price of the liter of butter oscillates between FCFA 500 and 550 at the beginning of the season. The rest of the time, it stabilizes at FCFA 600 and goes rarely beyond this price. As for the wooden spoon which is the other unit of measure, the price never changes. A spoon of shea butter costs FCFA 5 all the year round. However, the saleswomen modify the appearance so that its volume is not completely the same from a season to the other one. Thus, if during period of strong production 80 spoons can amount to a liter, in the dry season, a good hundred spoons would be required to reach the same measure. However, this unit of measure is used less and less because the women gain less money by it.

In Saraya things are much simpler. The tablet is the only existing unit of measure. The women sell it at FCFA 1 000 throughout the year, regardless of the quantity sought by the buyer. The sellers however agree to a reduction in price when the customers are few, or when they have a pressing need for cash. However this discount is rare, and it never reaches below FCFA 750 per liter.

By the apparent coherence which one observes concerning the price, one might reasonably conclude that there is a dialogue among the women of the various zones of production. Nothing could be further from the truth. We were able to verify for example that the producers of Salémata knew nothing at all about activities of their counterparts of Saraya and *vice versa*. The exchange of market information does occur, but it takes place only between the producers of the same area, cooperation in the setting of prices as in the mutual assistance in the various stages of the process of extraction.

Exchanges among the producers

It is processing saleswomen themselves who fix prices. In Saraya, they show themselves as firm and inflexible in the application of the consensual rate. In Salémata, price formation is a much more flexible process. On the day of the *louma*, for example, it often happens that by the evening one or several saleswomen may consent to lower the price, often motivated by an urgent need for obtaining primary foodstuffs. This established fact encourages the practice of sale on terms of barter or credit. No penalty is taken against the saleswomen who lower their price.

The fixation of the price is not the only moment when the producers have the occasion to exchange. Already in the process of transformation we have seen that they offer each other a helping hand. This mutual aid intervenes essentially in the most tiresome elements of the process – supply of the sheanut, pounding and grinding. So, when for example a producer in shortage of stock needs 3 kg of shelled nuts, she can address this request to another producer who holds a sufficient stock of nuts. The latter will ask her in exchange to crush the same quantity of sheanut in return. Another example of mutual aid may be seen in the case that a woman dedicates a whole day to help a producer in her work. In this case, she has the right to expect the same help in return on a subsequent occasion.

The last domain in which the women help is that of the use of processing equipment. Here, there is complete sharing. One can use the mortar, the grindstone or the winnowing basket of her neighbor as soon as these are free. These equipments are those of the home cooking. We did not meet a single case of producer which bought these equipments to intend them exclusively for the transformation of sheanut. This situation explains itself by the fact that the financial profitability of the same operation is not encouraging. This, at least, is the conclusion which we reached by conducting a simulation of the most likely scenarios.

Financial aspects

Let us consider the case of a producer who already maintains all the necessary equipment in her kitchen. If she has the possibility of collecting shea nuts for storage (as is generally the case for the producers of villages with dense shea populations), she can then produce

her butter without having to any spend cash. Her production capacity being put an upper limit at 32 liters during the four months of the rainy season considering the different imperatives, she can expect at best FCFA 35 000 in receipts if she is from Saraya and only FCFA 19 200 if she is from Salémata. If one supposes (an absurd hypothesis) that our producer makes the same earnings every four months during the rest of the year, she would gain FCFA 105 000 in the first case and FCFA 76 800 in the second. These figures are naturally higher than the actual because the greatest proportion of the butter is not sold, but rather goes toward household consumption.

Let us consider, further, the case where the producer must purchase all the sheanut she needs. With the increased burden she would thus be obliged to bear, one would imagine that the operative result of her efforts would indeed be well below the optimal.

Both cases which we have just envisaged offer illustrative examples of the financial profitability of shea processing. The first case is in fact an example of what takes place in the reality; it shows us that if the producers do not spend cash, it is simply because they do not invest with it. Besides, the earnings which they obtain are very meager and are out of proportion to the effort by which they are obtained. One can thus conclude that household consumption is a very fundamental element which favors the preservation of the activity.

The second case presents the example of an atypical producer; it allows us to measure the earnings which would accrue to a producer if she invested her cash in the production of shea butter. Not only would she not consume her butter, but in the end she would register a very weak return to her investment.

This is to say so that according to the current state of things, one cannot speak about financial profitability. The weakness of the production and the narrowness of the market seem to be the explanatory factors of this situation.

It is in this context that PROMER began its intervention in the shea sector. The objective from the beginning of this intervention it is the orientation towards much more interesting alternatives for the stakeholders of the sector.

II. THE INTERVENTION OF PROMER

Before examining in the detail the various aspects which have been addressed through the intervention of PROMER, it is important to give a brief summary of the project.

Brief summary of PROMER

PROSEA is a project of the Government of Senegal financed by the International fund for Agricultural Development (IFAD), with activities in the rural environment of four regions (Tambacounda, Kaolack, Kolda and Fatick) which are considered within the national context to be very deprived and/or in which the potential for non-agricultural small enterprise development is very significant. One of the most important objectives of PROMER is to increase production of quality goods and services through the commercial development of local resources. To accomplish this, PROMER works in partnership with local micro-entrepreneurs for their progressive acquisition of the technical capacities,

skills and attitudes necessary for the establishment or consolidation of their small enterprises. This partnership is effected by means of technical support and training, as well as commercial support, including research on market opportunities and sources of supply.

The various stages of intervention by PROMER

The base of the intervention of PROMER in the shea sector was a strategy elaborated and implemented from 1999. Of fundamental concern in all phases of this intervention was the progressive introduction of innovative elements in relation to current practices within the sector.

Sensitization

The first step for PROMER was to sensitize the producers with regard to the significance of national demand for shea butter, and as to the monetary value of this product. This process of sensitization undertaken mainly during the meetings between the producers and PROMER staff. In addition, the producers were facilitated to visit PHYTOPHARMA and the "*Maison du Karité*", two businesses in Dakar which manufacture cosmetic products based on shea butter. The process of sensitization also involved the consumers of the urban areas among whom most (to begin with those of the region) were ignorant of the presence of the shea tree in our country. This aspect of the sensitization process took place by means of developing contacts and facilitating visits exhibitions and trade fairs (e.g. FIARA, FIDAK, Technoforum).

Producers were facilitated to participate in two successive editions of the FIARA, in two editions of the Technoforum, and in all the editions of the FIDAK since the 13th. These important demonstrations allowed the producers to publicize their product to a very wide public audience. The most important step, however, was accomplished when the television magazine PASTEEF dedicated a segment to shea sector of Kédougou; this program was broadcast several times on national television, thus reaching many thousands of urban households.

The formation of producer groups (GPK)

At the same time as the sensitization, was set up in villages a structure called the Group of Shea Producers (*Groupe de productrices de Karité*, or GPK). This grouping of the producers of the same village was undertaken in response to the individual character of production and to the rustic character of the extraction techniques which make for difficult work and strongly limit both production and productivity. Besides which, the organization of such associations was seen as a necessary preliminary step in any serious attempt to develop producer access to new markets. Among the objectives for which the GPK were formed include:

- the institution of a membership subscription in kernels and / or in butter;
- the constitution of an appropriate ownership structure, both financial (through the collective sale of butter) and in kind (purchase and stocking of production material);
- facilitation of market access for the GPK as a whole, and for women belonging to the groups but producing individually.

The expected result was the increase the production and, over the medium-term, the establishment of operational units of shea butter production in the villages of the project area. Interestingly, this plan proved feasible only if the shea butter produced was assured to find buyers. It is this aspect which brings us to the subject of commercial support.

Commercial support to the producers

The objective of commercial support to the producers by PROMER was to identify market opportunities beyond the traditional context, to locate buyers interested in the shea butter and to put them in touch with the producers. It soon became clear that there is a strong demand from the private individuals on the urban market, characterized by direct users and / or intermediate consumers of the product, which can be classified according to three categories. These are as follows, in order of increasing commercial importance:

Small and Medium Industries:

This category is comprised of only the PHYTOPHARMA company, which greatly exceeds other consumers according to the volume of shea butter it purchases. This company was the first to be interested in the shea butter produced by the women supported by PROMER, and was thus a great support for the improvement of the price to producers, as well as the development of a sense of appreciation of quality concerns.

The retailers:

Hardly a half-dozen, the urban retailers buy shea butter loose or packaged in buckets of 13.5 kg for resale in the urban centers of the country, with a margin of up to 100 percent. Their clientele is comprised of their relations, the locals of their districts and by the wage-earning employees of the professional class whom they will have identified. The main concern of these retailers is the quality of the butter. They order, at irregular intervals, quantities between 25 and 100 kilograms.

The consumers:

This category of customers consists of residents of the city of Dakar and the towns of Tambacounda and Kédougou in particular. They buy the butter in jars of 0.5 to 1 kg, on the occasion of trade fairs or directly from the producers. They use the butter for their personal and household consumption and as gifts for their friends and relatives. The persons of this category are becoming the major buyers of shea butter from the women.

All these categories of consumers had until the advent of PROMER contented themselves with some butter come mainly of Mali. This butter which is present in quantity on the market presents however limits from the point of view of the quality of the fact notably conditions and duration of its conservation. Kédougou's butter the quality of which is nevertheless very considerable was absent in the market. The reasons of this absence are essentially:

The isolation (*enclavement*) of the zones of production:

The zones of strong production are characterized by their geographical and infrastructural isolation from the departmental seat of administration, which is itself in more than two hundred kilometers from the regional capital, Tambacounda. Roads leading to the

villages of production are in poor condition, and some become impassable during the rainy season due to flooding of the very numerous streams of the area.

The limited capacities of the producers, and disorganization of the sector:

Despite its plentiful resources, Kédougou is classified the poorest department of the country. The women who for their part occupy the bottom of the scale in terms of their poverty, and work in a individual way, can not cover the necessary costs to market their butter outside the zones of production.

Product packaging unsuitable for the urban consumer:

The packaging materials and sizes in which the butter is marketed in the zones of production are not suitable to the urban consumers. Indeed the butter is sold either the liquid state, without even rudimentary packaging, or otherwise solidified and packed in leaves of *Cola cordifolia*. In both cases, the butter opens to contact with the elements, which can have a negative effect on its quality. During transport, the butter packed in leaves is exposed to risk of melting given the high ambient temperatures of the region, nearly throughout the year.

To satisfy consumer demand, it was necessary to find ways and means to overcome or at least to avoid these obstacles. To accomplish this, PROMER began to support the women to organize the collection and distribution of the butter. Accordingly, all the shea butter sold during the first years with project support was transported with the assistance of the project. The collection of this butter has also necessitated the direct involvement of the agency and means of PROMER.

The support for the marketing of Kédougou's shea butter would not have been successful had not been integrated with technical support.

Technical support

Technical support to producers has resulted in a better knowledge of the sector and an increased awareness of product quality considerations. The interventions undertaken at this level are quite diverse; including:

The implementation of market studies

Six studies were conducted by the staff of PROMER and / or by consultants contracted to PROMER; including:

Study of the shea butter sector in the Department of Kédougou (PROMER, 1998a). This study was made at the very beginning of the intervention of PROMER to initiate awareness of the intervention of the agents on the ground.

Technical specifications for shea butter (PROMER, 1999). This study consisted of the collected of a set of technical information about shea butter, elaborated with information collected on the ground as well as published literature on the shea resource.

Expertise in traditional processing of shea butter in Saraya (PROMER, 1998b). This study was conducted by PROMER staff in order to document techniques used by the women in the production of shea butter.

Resource assessment of the shea parkland in the Department of Kédougou (Baba Ba, 1999). The objective of this study was to assess the shea parkland in the department of Kédougou, including both quantitative and qualitative aspects.

Study on the production of shea butter (Marie Diallo, 1999). Very practical, this study by Dr. Marie Diallo of PHYTOPHARMA allowed in PROMER to constructively engage the producers on a product for which technical expertise is limited in our country.

Evaluation of the interventions of PROMER in the shea sector of the Department of Kédougou (GECOM, 2002). This last study is in progress at the time of writing. The results of the study should be presented on the occasion of a workshop on the shea resource, which will be organized by PROMER during 2002 at Kédougou.

Each of these studies has enabled PROMER to select the most promising commercial and technical options through a better understanding of the shea sector and its stakeholders, products and procedures.

The improvement of the quality of shea butter

This task involves providing technical advice to the producers concerning the various factors to be taken into account in the collection and the storage of shea nuts, processing and product packaging, based on the recommendations developed by Dr. Marie Diallo, with the objective of improving the quality of the finished product. This task was reinforced through the collection of product samples of shea butter on sale according to the texture and by laboratory testing of quality aspects including the acidity (free fatty acid content) of the selected butter. This relatively simple test was introduced with the support of Dr. Diallo. The required laboratory materials were acquired, and PROMER staff trained in the testing procedure.

Training in the production of soap based on shea butter

This training pursued a double objective. On one hand, it offered an alternative product application for utilization of shea butter excluded from the circuit of marketing during the process of selection; on the other hand, it allowed the producers to diversify the range of products derived from the shea tree.

Testing of a shea press in collaboration with ATI (International Technological Alliance)

Though the press did present some advantage in reduction of labor, the press gave extraction yields considerably lower than that obtained by the women using traditional methods of extraction. The press, which had been designed for the extraction of sesame oil, was thus not very popular.

Introduction of packaging in jars

Plastic jars of two sizes were obtained wholesale and sold retail to the producers at an affordable price. The jars, which hold respectively 0.5 kg and 1kg, are sold by the producers at variable prices according to the point of sale, but which guarantee in any case a of FCFA 1 000 per kilogram of butter. Attention to packaging methods and materials is of great importance in the sense that it enables producers to offer the butter in different volumes, both of which are suitable for adapted to the urban market. The packaging of shea butter in jars has also enabled producers to diversify and to increase the clientele, from industry and traders to the consumers themselves. Finally, improved packaging has allowed to the producers to retain a greater share of the value derived from shea products.

The results of intervention by PROMER

If PROMER has succeeded in a single aspect of its intervention in the shea sector of Senegal, it would be to have brought the sector out of obscurity to the forefront of national awareness, a process which began only a few short years ago. The producers have begun to understand that this activity, which they considered as difficult and tiresome work, was in fact a real instrument of economic and social emancipation which they held in their hands. This awareness came notably from knowledge of the monetary value of shea butter, and the discovery marketing opportunities more profitable than those existing at the local level. This awareness has empowered the producers to address considerations and variables of product quality, packaging and presentation. At the same time, Senegalese consumers have learnt that shea tree is not only a resource peculiar to Mali or Burkina Faso - and these consumers are now and increasingly inclined to buy the local shea butter of quality regardless of the expense.

On the ground, a total of 12 Groups of Shea Production (GPK) in have been established in the District of Salémata, and six in Saraya. Eleven of these groups were able to benefit from project activities and the support of PROMER, including seven groups in the area of Salémata and 4 in that of Saraya. The women of the 11 participating GPK were able to sell, with the support of PROMER, some 2.5 tons of butter over three years, thus realizing an income of FCFA 2 750 000. This quantity does not take into account the butter sold by the women by their own means at the local level. One can not determine the exact figure concerning this butter sold at the local level, because these local sales are not recorded. One can only assert that for the women having benefited from the commercial support of PROMER this figure is important even if it is below the 25 tons sold through the project over the same period. This means that there has been an increase in the production, and the cause of this increase is a greater demand for shea butter.

As the other significant result, one noted the opening of accounts in the ACEP and in CMS for three GPK among whom two benefited afterward from financing which they used in the activity of production of butter.

However modest they are, these results were only achieved with difficulty, considering numerous constraints of different types noted here and there.

The difficulties encountered

The most significant obstacles to success of the program were due to the isolation of the zones of production, concerning which it has been noted above that some areas become inaccessible during the rainy season, which is also the period of strongest production of shea butter and mobilization of the producers in field. However, this isolation results in more than simple infrastructural inaccessibility; it also effectively prevents the exchange of information, and exacerbates and perpetuates the problems of illiteracy and the poverty. These elements are among the many factors which ensure that the women are not sufficiently equipped to negotiate a presence on urban markets, nor respond effectively to the rigorous competition within the sub-region.

Another obstacle encountered was the difficulty in building a strong sense of group membership among the GPK. Indeed, the production is always done in an individual way, and the membership subscription in shea butter and in kernels established within the GPK is not yet respected by all the women. The GPK have not as yet managed to imbue the membership with the logic of micro-enterprise, so that the only objective pursued by the majority of their members is to sell their butter through the facilitation of PROMER, and nothing beyond that. This established fact illustrates the difficult task faced by PROMER in balancing between facilitating commercial progress and building the capacities of the producers, without at the same time building a sense of dependency which would put at serious risk the sustainability of project activities following disengagement by the project, and the full assumption of the necessary responsibilities by the producers and other stakeholders of the shea sector.

CONCLUSION AND PERSPECTIVES

Seen in perspective, the accomplishments and benefits to producers accrued under the project are significant, though they still remain fragile. The paths of actions envisaged by PROMER aim at consolidating and reinforcing these gains in the context of a phased handover of project activities to the beneficiaries and other stakeholders of the shea sector. This process must of necessity involve improving the internal organization of the GPK, which should take on a progressively greater share of responsibilities in order to preserve the sustainability of their productive enterprises. This process may ultimately involve the creation of a producers' union in order for producers to benefit from a broader capacity for action and negotiation.

However, the improvement of the organization of the GPK can only succeed if it includes attention to the improvement of product quality and the packaging, the introduction of techniques and technologies for improved processing, and the diversification of products derived from the shea resource (*e.g.* up-market soap, jams and jellies of shea fruit, and cosmetics based on shea butter. As such, technical exchange visits and the exchange of information and experiences between Senegal and the other producing countries of the sub-region could serve as an important catalyst for progress.

Also, the successful organization of the GPK can be envisaged only within the framework of an intensification of the capacities of the women, notably by the elimination of illiteracy and the provision of training in the basic elements of record-keeping, accounting, management and marketing.

These perspectives serve to illustrate the initial progress along the difficult road which remains ahead, over a ground strewn with pitfalls. On this road, PROMER does not aspire to go it alone, but rather invites all available structures of support and interested partners in the process to work together, in order to build a better future for the shea-tree, and the women who serve as custodians and primary producers of the shea resource.

Strengthening the Technical and Management Capacities of Women in the Shea Sector of Zantiébougou (Mali)

Koné Mariam Traoré

Association Malienne de la Promotion de Jeunesse (AMPJ)

The AMPJ is a national women's NGO created in 1989 and registered on December 12, 1990, under the Reg. No. N 815. The AMPJ is a signatory of the Framework Agreement No. 198 of February 11, 1991, with the Government of the Republic of Mali.

The mission of the AMPJ is to contribute to the improvement of the living standards of the people in general, and those of children and women in particular, through basic education for all, and support to income-generating activities.

The objectives of the AMPJ are to:

- improve the incomes of women, particularly through promotion of the income-generating activities, through training, extension of technologies, and provision of credit; and
- promote the intensification of the capacities for self-promotion on the part of rural communities, and the improvement of the access to education.

THE AMPJ intervenes in 69 villages in the region of Koulikoro, and in 45 villages in the region of Sikasso. The AMPJ supports community schools, and supports 45 women's groups in the regions of Sikasso, Ségou, Koulikoro, Mopti and in the district of Bamako.

Experiences of the AMPJ in the framework of women in the shea sector

THE AMPJ, in its dynamics of research and action for development, has been actively working with women in the shea sector in the districts of Zantiébougou and Bougouni since 1991. This intervention has been undertaken in three main phases.

- PHASE I: support for women in the marketing of shea butter

Further to a study of environment in 1991 to Zantiébougou, the AMPJ determined that - in spite of the high potentialities of the zone (abundance of the products of crop, abundance of rain, easy access, etc.) - an ever-increasing poverty persists, especially for rural women.

The underlying causes that we identified with regard to the case of the women were:

- 1) High rates of illiteracy
- 2) Incapacity of information and lack of access to training opportunities
- 3) Lack of organization
- 4) The excessive workload of the women engaged in rural activities, particularly at the time of the shea harvest

- 5) Lack of familiarity with improved shea processing techniques and relevant appropriate technologies
- 6) Lack of access to processing equipment

The activities of AMPJ for the women in the marketing of the shea butter were supported from 1992 to 1993 with financing from the fund of the Coordinating Committee of NGO Actions (CCA).

This phase consisted at first in organizing the women in functional women's groups, as this type of community-based organization remains an important unit of dialogue and self-advancement in the rural areas. These community-based groups build themselves up either by initiative of their members, or by support from the national support structures working to promote the development of under-served areas and communities.

In both cases, the objective is to identify solutions to the problems which individuals alone cannot easily resolve. Organized into groups, members can be reached more easily in order to access the technical and financial support of donor agencies and NGOs.

During the annual period of abundance in 1992, the women of Zantiébougou were sought on behalf of certain buyers for purchase of their butter. Indeed, these buyers obtained their product dirt-cheap - at 80 FCFA/kg, as compared to a normal (seasonal high) price of FCFA 250, or even FCFA 300 on the markets of the regional capitals, or at Bamako.

Aware of this situation, the AMPJ provided grants of FCFA 300 000 to each rural women's producer group, in support of marketing activities. These funds were used to build a store for stocking in one of the concerned villages (Falaba), and to establish a training program for elimination of illiteracy accompanied by a series of trainings in management skills.

During the next period of abundance, the groups supported by AMPJ used this fund to buy the butter of their members at a more remunerative price of FCFA 125 instead of FCFA 80, then store it for sale during the periods of scarcity at a much more competitive price of FCFA 250.

At the end of this phase, satisfactory results were obtained. As example of this success, one can cite the experience of the group of Falaba which, by means of the returns from this arrangement, was able to finance the construction of a maternity clinic, and to buy itself a cart, among other benefits. The group was also able to open a bank account at the BNDA Bougouni with a capital deposit of departure of FCFA 500 000 – and, year after year, this capital increases.

This first phase of AMPJ support also allowed the women's groups of the villages of Falaba, Sirakoro, Toumou, Kimi and Sorona to make substantial profits, and particularly to organize themselves in an effective manner around the marketing of shea butter, which is their source of main income.

- PHASE II: Intensification of the technical capacities of the women in the exploitation of the shea tree, 1994-1995

Satisfied by the initial results obtained, the financial partner invited us to introduce a second phase for the consolidation of these experiences, while providing us with the necessary financing. This stage was predicated on the understanding that the shea butter produced by artisanal methods had qualitative incapacities (especially aspects of odor and color).

Further research undertaken by the AMPJ showed that there is a correlation between the quality of the butter and aspects of collection, storage, the techniques of pre-treatment and processing of nuts, as well as the extraction and post-extraction processing of shea butter. Thus, the second phase emphasized the mastery of techniques and the technologies of collection, storage, processing and packaging for an improvement of the product quality.

In March, 1995 we organized a study trip to Burkina Faso for the women of the producer groups and the AMPJ team to the SNV shea project at Koudougou, and to the group SONG-TAABA at Ouagadougou. This working visit allowed us to identify an appropriate package of techniques and technologies, and a set of 'best practices' ranging from techniques of collection to processing and packaging of the finished product.

Another important aspect of this second phase was the sensitization of the populations in the conservation and regeneration of shea tree through sessions of sensitization, and in the planting and preservation of a hectare of shea tree by each village, or five hectares in total. This sensitization truly bore fruit, because shea trees planted by the women were sustained only with difficulty for the first five years of their development.

The results obtained during the second phase of AMPJ support to the shea sector were:

- Better quality of the butter produced.
 - Improved packaging.
 - Easy market access for stocks.
 - More remunerative prices (of up to FCFA 300 F).
 - Women were made aware the importance of conservation of useful tree species (including shea, néré, and tamarind).
- PHASE III: Support for the feminine groupings of Zantiébougou in the exploitation of the shea tree, 1998-2002

This third phase can be considered not only as a consolidation of the first phases but also an intensification of the intervention capacities of the AMPJ through progressive extension of the project to 43 villages of Zantiébougou.

Financed by the African Development Foundation, the third phase program aims at 2 main objectives:

- 1) To strengthen the intervention capacity of the AMPJ in order to supply an effective and efficient assistance to the women's producer groups which are engaged in shea production as an income-generating activity.
- 2) Improve the conditions of life of the women through the establishment of a company of production and economically profitable marketing.

The current phase aims essentially to strengthen the capacities of women's production and marketing organizations. For this purpose, several modules of training have been developed, including (among other topics) aspects of group dynamics, financial management and marketing. At the same time, further study visits and inter-group and exchanges within the sub-region are also planned.

The project has already built a center of production of shea butter for the Producer's Union of Zantiébougou, including five multifunctional grinding mills and fifteen hand-presses. Capital for product marketing has already been made available since the 2000-2001 campaign, and logistical means have since been provided to the project.

As for the AMPJ, a field office was built at Zantiébougou, including a large training facility. The project is in the course of execution; however, the following results have already been obtained:

- Construction and equipment of a center of shea butter production.
- Construction and equipment of an AMPJ field office at Zantiébougou.
- Extension of techniques and technologies of storage, processing, packaging of shea products.
- Training in group dynamics, financial management and marketing management.
- Constitution of operational working groups; creation of 15 centers of literacy training in 15 villages, with 20 literacy extensionists per village (a total of 300 literacy extensionists).

The other experiences of the AMPJ in the shea sector

- The AMPJ trained extensionists of the Office of the High Valley of the Niger (OHVN) on shea processing methods "From the Fruit to the Butter" from 01 to 05 August 2000, in the center of production of Zantiébougou.
- The AMPJ also trained the rural women of Diola, supervised by the project on promotion of the shea sector of the SNV, on August 17, 2000.
- The AMPJ organized a national day of information about the shea sector on May 04, 2000, in partnership with the Ministry of the Rural Development and the CAFO.

Perspectives of the AMPJ during 2000 to 2005 in the shea sector

The activities undertaken by the AMPJ in favor of the women correspond to the orientation of the Government of Mali, and lie within the framework of the action plan of the Ministry of the Promotion of Women, Children and the Family to fight against poverty by the improvement of the living standards, and to facilitate the work of the rural populations generally, and that of the women in particular.

With the results of these first experiences, which are positive in terms of organization of the women and in terms of improvement of their incomes, we are now faced with requests for further support both within our various zones of intervention, and in the regions of Ségou, Koulikoro and Sikasso.

We are considering introducing in each of these regions a program of support for the women's groups in the exploitation of the shea tree, in the intensification of the capacities of organizations, and techniques of the women in the exploitation of the crop products in partnership with the Ministry of the Promotion of Women, Children and the Family in order to improve the incomes of rural women.

Thus, through the trainings with which they will be provided, the women will be empowered to participate more actively in the socio-political and economic life of their villages, and so to attain more important positions of responsibility within the decision-making bodies.

The program of improvement of the organizational quality of the groups, by improving product quality – most notably of shea products - will facilitate marketing activities, especially at the level of the export, and will contribute to a more advanced socio-economic position for women who will allow them better to position themselves, their families, and in their communities.

The shea tree constitutes a most important resource for the future of the rural women in Mali. It is necessary to provide all the necessary means to protect and to regenerate this resource, so as to guarantee a sustainable development, and a brighter future for our country.

APPENDICES

- 1. Workshop Terms of Reference**
- 2. Workshop Agenda**
- 3. List of Participants and Contacts**
- 4. References**

Appendix 1: Workshop Terms of Reference

From 4-6 March 2002, FAO will convene a workshop (jointly funded by CFC and FAO) to bring together a variety of stakeholders in order to address critical issues of shea processing and trade across the African shea zone. Countries to be represented by workshop participants include Benin, Burkina Faso, Cameroon, Chad, Central African Republic, Cote d'Ivoire, Ethiopia, Ghana, Guinea, Mali, Niger, Nigeria, Senegal, Sudan, Togo and Uganda. The workshop will serve the following objectives:

1. to bring together all relevant information and to evaluate past experience on processing and marketing of sheanut and shea butter at the local, regional and international levels;
2. to identify key constraints and potentials in processing and marketing of shea products at the local, regional and international levels;
3. to formulate strategies to enhance processing, utilization and marketing of shea products in a sustainable manner, with recognition of the key role of rural women in shea production, and a focus on reinforcing producer equity through fair trade;
4. to identify priority areas of intervention, and to synthesize regional action plans for future research and development activities;
5. to disseminate as widely as possible the information gathered and the results produced by the workshop.

Main issues to be addressed during the workshop will include:

- (i) the role of research institutions, state agencies, NGOs and donors, and how their interventions can best assist small-scale producers and facilitate market access;
- (ii) the assessment, reliability and renewal of the sources of supply, including issues of management, conservation and research and development of the shea resource;
- (iii) development of improved, locally appropriate processing and storage methods and technologies and their transfer to users;
- (iv) resource and equipment requirements of rural producers, producer groups and associations;
- (v) organization of small-scale producers, processors and traders, with emphasis on producer equity and ownership by women farmers, the primary producers of the shea resource;
- (vi) means to develop local, regional and international markets, including the development of fair trade markets;
- (vii) development and diffusion of product quality standards, and techniques of production quality control, for maximum added value in extraction and increased returns to the producer;
- (viii) opportunities for national and regional public-private partnerships; and
- (ix) networking and cooperation between institutions and individuals in producing countries in the areas of research and development, training, quality control systems, and market information.

Appendix 2: Workshop Agenda

WORKSHOP ON THE PROMOTION OF SHEA PROCESSING AND TRADE IN AFRICA, DAKAR 4 – 6 MARCH 2002

4 March 2002:

08:00 – 9:00 Hrs	Registration
09:30 – 10:15 Hrs	i) Opening ceremony
	<u>Welcome Address</u> , Amadou Mactar Niang Director General, Centre de Suivi Ecologique (CSE)
	<u>Opening Remarks</u> , M. Edouard Tapsoba Resident FAO Representative, Sénégal
	<u>Opening Address</u> , M. Mohamed Ramouch for the Common Fund for Commodities (CFC)
	<u>Opening Address</u> by His Excellency M. Modou Diagne Fada Minister of Youth, Environment and Public Hygiene
	<u>Pause</u> Group photo in the gardens of the Hotel Ngor Diarama Inauguration of the shea products exhibition Coffee Break
11:50 -12:30 Hrs	ii) Opening Remarks
	Presentation of the Symposium objectives and expectations <i>Shakib Mbabaali, FAO</i>
	The Shea Resource: Current Status of Research and Development across Africa <i>Eliot Masters, FAO Consultant</i>
 PLENARY SESSION 1: THE SHEA RESOURCE: CHARACTERISTICS, MANAGEMENT AND CONSERVATION ISSUES	
12:30 – 12:50Hrs	The Shea Tree <i>Vitellaria paradoxa</i> and the African Shea Parklands <i>Dr. Edouard Bonkongou</i>
12:50 – 13:10 Hrs	Conservation of the Shea Parklands through Local Resource Management <i>Dr. Joseph Obua, Makerere University</i>

13:10 – 13:30 Hrs	Women and the Shea Resource: Issues of Ownership and Producer Equity <i>Dr. Marie Diallo, UNIFEM Consultant</i>
13:30 – 13:50 Hrs	Improving the Shea Resource: Aspects of Applied Research <i>Ismaila Diallo, ISRA/CNRF</i>
13:50 – 14:30 Hrs	Plenary questions/discussions on resources
14:30 – 15:30 Hrs	Lunch break

PLENARY SESSION 2: UTILIZATION, PROCESSING AND PRODUCT QUALITY

15:30 – 15:50 Hrs	Benefits of Shea to Rural Households, Communities and Nations <i>Félicité Traoré, CECI</i>
15:50 – 16:10 Hrs	Overview of post-harvest handling, processing and storage of sheanut in African countries <i>Dr. César Kapseu, ENSAI</i>
16:10 – 16:30 Hrs	Discussion
16:30 – 16:50 Hrs	Coffee break
16:50 – 17:10 Hrs	Industrial-Level Uses and Quality Control for International Commerce of Shea Products <i>Lars Laursen and Marcellin Kassi, AARHUS</i>
17:10 – 18:00 Hrs	Wrap-up of the first day
19:30	Cocktail reception

5 March 2002:

PLENARY SESSION 3: TRADE, MARKETS AND SHEA PRODUCT MARKETING

09:00 – 09:20 Hrs	Market Trends and Perspectives for Shea Products <i>Sylvain Matte, CECI</i>
09:20 – 09:40 Hrs	Building New Markets for Shea Products: Perspectives from Eastern Africa <i>Eliot Masters, FAO Consultant</i>
09:40 – 10:00 Hrs	International Standards for Raw and Processed Products, Quality Control and Certification Systems for Exported Products <i>Enrico Casadei, FAO</i>
10:00 – 10:30 Hrs	Discussion
10:30 – 11:00 Hrs	Coffee break

***PLENARY SESSION 4: ROLE PLAYED BY THE DIFFERENT STAKEHOLDERS
IN THE KARITÉ SECTOR***

11:00 – 12:30 Hrs	- Farmers: <i>Anna Awio, NUSPA</i> - Private sector: <i>Lars Laursen, AARHUS</i> - NGOs: <i>Félicité Traoré, CECI</i>
12:30 – 13:00 Hrs	Discussion
13:00 - 14.30 Hrs	Lunch break
14:30 – 15:00 Hrs	- Local governments: <i>Diallo Mah Koné, OHVN</i>
15:00 – 15:30 Hrs	- Research institutions: <i>Jules Bayala, INERA/DPF</i>
15:30 – 16:00 Hrs	Discussion
16:00 – 16:30 Hrs	Coffee break
16:30 – 17:00 Hrs	Resolutions from stakeholder groups
17:00 – 18:00 Hrs	Wrap-up of the second day

6 March 2002:

***POTENTIALS AND STRATEGY PROPOSALS FOR IMPROVED DEVELOPMENT
OF THE SHEA RESOURCE***

9:00 – 10:00 Hrs	Presentations on shea product development <i>Marie Diallo and Taïb Diop</i>
10:00 – 11:00 Hrs	Discussions according to working groups:
Working Group 1: Resource improvement (applied research and technical aspects) <i>Jules Bayala and Paul Vantomme</i>	
Working Group 2: Harvesting and transport, processing and quality control <i>César Kapseu and Enrico Casadei</i>	
Working Group 3: Trade and marketing improvements <i>Sylvain Matte and Cécile Broutin</i>	
Working Group 4: The social perspective: access to resources, income equity and benefit sharing at all levels <i>Marie Diallo and Koné Mariam Traoré</i>	
10:30 – 11:00 Hrs	Coffee break
11:00 – 13:00 Hrs	Working Group Discussions Continue

13:00 - 14.30 Hrs	Lunch break
14:30 – 15:00 Hrs	Wrap-up and Summary of Discussions
15:00 – 16:30 Hrs	Presentation of Working Group Recommendations
16:30 – 17:30 Hrs	Closing Remarks <i>Mohamed Ramouch, CFC</i> <i>Pape Koné, FAO</i>

Appendix 3: List of Participants and Contacts

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