UNIVERSITY OF NAMIBIA

MULTIDISCIPLINARY RESEARCH CENTRE (MRC)

Science, Technology and Innovation Division

Indigenous Knowledge system Technology (IKST) Food Program

Field Trip Report

Study on Indigenous Fruits and Ethnobotanical Uses in Ohangwena and Oshikoto Regions

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1. EXECUTIVE SUMMARY

Research into Indigenous Knowledge System Technology (IKST) has been receiving increasing attention from various research institutions and Government Ministries in Namibia during the last five years. Indigenous communities in Namibia possess a rich traditional knowledge expressed in many practices in their communities. Indigenous wild edible fruits are available within the Namibian 13 regions which provide a rich source of vitamins and fibres for indigenous people's diet. The aims of this study were to record the different IKST practices on the indigenous fruit trees in Ohangwena and Oshikoto regions. Three constituencies in Ohangwena region were surveyed; these including Okongo, Eanhana and Ondobe Constituencies. In Oshikoto region; only one constituency which is Onayena was included in the survey. A total of 65 respondents were interviewed; 54% women, 38% men and 8% both in group interviews. The majority of the people interviewed were in their thirty's, with the youngest being 18 years old and the oldest being 98 years old. Thirty eight plant specimens were collected of which 24 are from Ohangwena and 15 from Oshikoto region, these specimens belong to 18 genuses and 23 species.

Regarding to the indigenous knowledge; most of the respondents indicated that their knowledge on indigenous fruits was learnt mainly through their parents. Almost all of the respondents reported that the indigenous fruits and their products have social values such as it is presented to guests at special ceremonies, weddings, etc. In addition to their social values; health values have been reported also especially with regard to has flu. Some people depend on these fruits and their by-products to get income, for example Distilled liquor from Eembe (*Berchemia discolor*), Palm fruits (common practice in Oshikoto region). Most of the peoples reported that the traditional beer and wines are the main products made from these fruits.

Results regarding indigenous peoples' perception on the declining local indigenous fruits revealed that 56.25% of the respondents reported that indigenous fruits were declining. Only a 42.18% indicated that the indigenous fruits populations are increasing, while only 1.56 % recognized the fact that indigenous fruit trees number is constant. On the abundance of the indigenous fruits; most of the respondents indicated that most of the indigenous fruit trees are scattered and presently safe (36.85%) on the other hand; some that are threatened (15.80%) and 36.85 % are doubtful about the abundance of these trees in their villages. Regarding to the management practices to improve the production of these indigenous fruit trees; 38.60 % reported that there are some efforts on management practices; on the other hand 61.40 % reported there are no management practices on the indigenous fruit trees in their areas. On the ethnobotanical knowledge and ethno-pharmacological uses of the indigenous fruits, the following diseases and ailments have been reported to be treated: toothache, diarrhea, cough, tonsillitis, burns, skin allergy, stomach ache, snake bit, constipation, etc. Very few have mentioned an ethno veterinary uses of these fruits, e.g. the use of the *Ziziphus mucronata* roots to treat diarrhea in cattle, the bark of eembe (*Berchemia discolor*) to treat calf weakness. Many products have been reported to be done from indigenous fruits, these include: juice like Marula juice, traditional beer and wine like monkey orange, eembe and marula, oil like marula and Ximenia oils. Some respondents have reported on adding these fruits to their local porridges and others have reported that they prefer to dry and consume them during food shortage times.

2. INTRODUCTION

The common knowledge to a particular community or people living together in a certain area, generated by their own and their ancestors experience is generally referred to as indigenous knowledge (IK) to that specific society (Ohiokpehai, 2003), this term has been described as the local knowledge that is unique to a given culture or society (UNESCO, 1999; Dan *et al*., 2010). This indigenous knowldege is regarded as valuable and considered as the local people's capital (Mapaure and Hatuikulipi, 2008; Cheikhyoussef et al, 2011), and if not preserved, it may be lost forever to society. With the development of the knowledge economy, knowledge has become one of the most important resources for social progress and economic development (Liu and Gu, 2011).

The term indigenous knowledge, traditional knowledge and ethno science have been used interchangeably to describe the knowledge system of an ethnic rural group that has originated locally and naturally. Indigenous knowledge is an essential cultural and technological element of human societies. It is unique to a particular culture and acts as the basis for local decision making in agriculture, health, natural resource management and other activities. It is embedded in community practices, institutions, relationships and rituals. Indigenous people view the world they live in as an integrated whole. Their beliefs, knowledge, arts and other forms of cultural expression have been handed down through the generations. Food production in these societies is focused more on long term sustainability rather than on short term yield increase and hence, enhanced biodiversity. This helps to reduce ecological and economic risks, promotes diet diversity and allows proper temporal and spatial distribution and utilization of resources (Ghouzhdi, 2010)

Great emphasis has been recently laid on the role of traditional foods in the health and nutritional status of the people. Most of these foods have a good proportion of some nutrients and can make a significant contribution to daily nutrient intake, especially for those of low social classes. Additionally, traditional foods constitute an essential aspect of cultural heritage and they are highly regarded by the community (Musaiger *et al*., 2000). Despite lack of scientific knowledge, many local peoples understand the benefits of indigenous food in maintaining their culture and their health. Indigenous foods are being studied for scientific identification, nutritional composition and cultural food use; however, there is still much to be done and be learned (Mbhenyane, 2005).

There is a tight link between cultural and biological diversity; these are increasingly viewed as key elements in achieving sustainable development, because of its interdisciplinary nature, combining natural and social sciences, culture, education, economic value and communication (Persic and Martin, 2008). The importance of wild fruits in the diet depends to a large extent on availability of domestic fruits. Most wild fruits are consumed in spring and summer, and this consumption been associated with potential health benefits (Isabelle *et al*., 2010). Indigenous fruit trees have been given so little attention, both in research and extension, though they are important in the diet (Amarteifio and Mosase, 2006). These indigenous fruit trees play important roles in rural peoples in Namibia (Musaba and Sheehama, 2009) and Botswana (Motlhanka *et al.*, 2008). They are normally eaten in rural communities and more popular ones are sold in the local urban markets when in season (figure 1).

Figure 1 Indigenous fruits sold in the local open market in Omuthiya constituency in Oshikoto region

The World Health Organization (WHO) and Food and Agricultural Organization (FAO) (2003) recommended the daily consumption of at least 400 g of fruits and vegetables for the prevention of heart disease, cancer, type-2 diabetes and obesity. The consumption of fruits with a high antioxidant (phenolic compounds, ascorbate and carotenoids) has been associated with a lowered incidence of degenerative diseases including cancer, heart disease, inflammation, arthritis, immune system decline, brain dysfunction, and cataracts (Leong and Shui, 2002).

There are some threats affecting the existence of wild fruit trees. They are cut down in areas where wood is scarce and are used for fuel. They are also being removed from cultivated fields where tractors are now widely used and where, trees are seen as an inconvenience. Further research and extension on wild fruit trees should be a priority; otherwise with time this valuable resource may disappear (Campbell, 1987).

According to the PhytoTrade Africa (the Southern African Natural Products Trade Association), natural products are considered to be of any product that is harvested from the wild or grown in the wild (Ariyawardana *et al.*, 2009). Bennett (2006) defined natural products as;

being plant derived, occurring naturally, wild harvested or cultivated in situ, sustainably harvested and pro-poor. He shows that natural products have the following characteristics; multiple products, multiple end uses, multiple potential target markets and multiple embedded values (Ariyawardana *et al.,* 2009). The Edible Indigenous Fruits forms an essential part of the Natural products source in Africa and Namibia specifically. The phytopharmacuetical, neutraceutical or functional foods and cosmetic markets have gained commercial attention as these natural plant species are so important in the making of beverages, foods, cosmetics, oils, health care products, herbal teas, nutritional supplements and medicinal products(Ariyawardana *et al.,* 2009). Natural products derived from plants are diversified and could be classified under different categories based on their uses (figure 2).

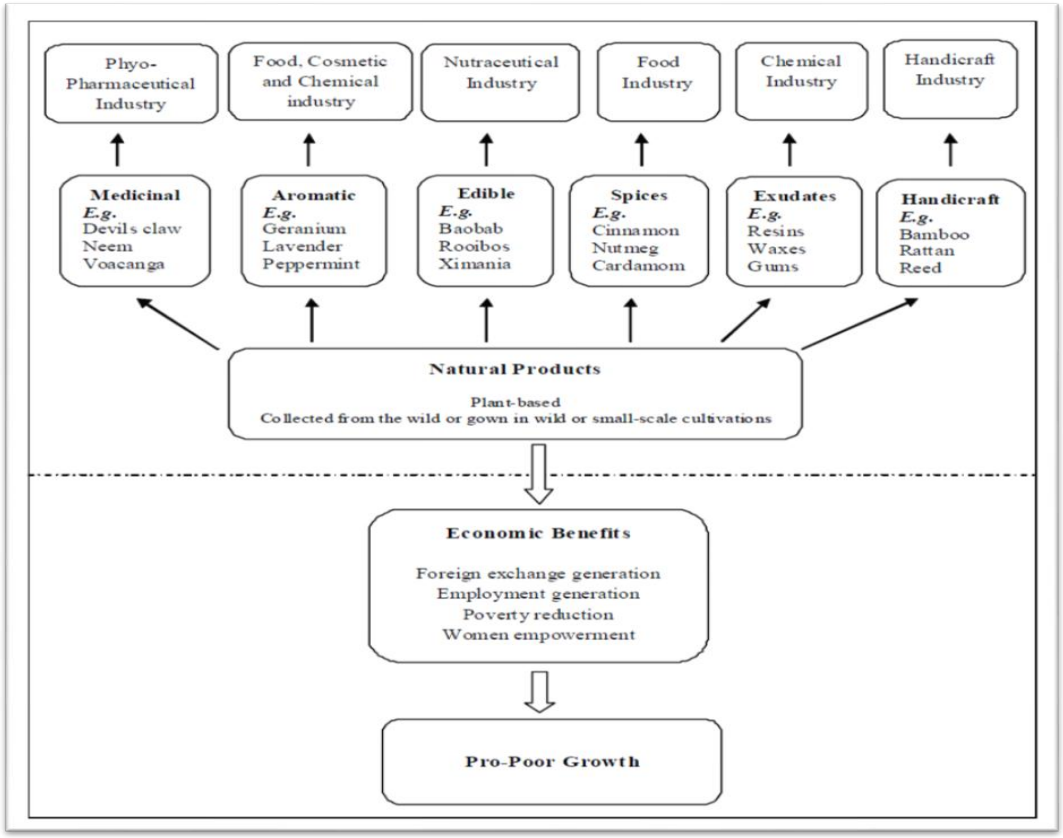

Figure 2 Natural products and their Uses (Sources: Bennett, 2006; Ariyawardana *et al.*, 2009)

The most significant contribution, in gross economic terms, of natural products to an economy is the foreign exchange generation through exports. However, given the complexity of natural product use it is difficult to obtain a comprehensive list of natural products that are exported from countries. Table 1 shows the total world export values of only 12 natural product groups at the 4- digit level. In 2007, these 12 natural product groups have contributed over US$ 11 billion through exports (International Trade Centre, 2007). This highlights the economic significance of natural products to the exporting countries.

Table 1 Natural Product Exports in 2007; Sources: International Trade Centre (2007) & Ariyawardana *et al* (2009).

Product Code	*Product Label*	*Value in US$1000*
1302	Vegetable saps and extracts	3,200,411
1301	Lac; natural gums, resins, gum-resins and balsams	558,271
3301	Essential oils; resinoids; terpenic by-products etc	2,432,331
0903	Maté	72,975
0904	Pepper, peppers and capsicum	1,862,352
0905	Vanilla	124,090
0906	Cinnamon and cinnamon-tree flowers	191,946
0907	Cloves	155,389
0908	Nutmeg, mace and cardamoms	307,680
0909	Seeds of anise, badian,fennel,coriander, cumin, etc.	370,450
0910	Ginger, saffron, turmeric, thyme, bay leaves & curry	1,024,449
1211	Medicinal plants	1,694,419
	Total Value of Exports	11,994,763

Bennett (2006) studied the marketplace of 10 Southern African developing countries showed that natural products have a trade potential of US$ 3,428,962,767 per year. However, current trade statistics reveal that only US$ 12,121,491 has been captured by these countries (Table 2). Similarly, statistics show that natural products industry has a high potential in creating employment opportunities especially in gathering. Most importantly, gathering, processing and

commercialization of these natural products are carried out by poor and vulnerable, particularly women (Ndoye, 2005; Shackleton and Shackleton, 2004). Therefore, the natural products industry has a great potential in empowering women and raising their status within the household (Ariyawardana *et al.*, 2009).

Table 2 Current and potential by Product from ten Southern African Developing Countries (SADC); Sources: Bennett (2006) and Ariyawardana *et al* (2009).

Product	*Current trade (US$/Yr)*	*Potential trade (US$/Yr)*	*Current households employed (gathering only)*	*Potential households employed (gathering only)*
Adansonia digitata				
Baobab	11,203,928	961,358,568	1,165,965	2,640,333
Kigelia africana				
Kigelia	375,563	1,588,050,000	441,125	1,764,500
Sclerocarya birrea				
Marula	425,000	263,001,008	3,475,250	2,436,667
Ximenia spp.				
Ximenia	58,500	37,566,884	303,933	1,514,667
Trichilia emetica				
Trichelia	-	501,665,967	1,144,833	2,289,667
Citrullus lanatus				
Kalahari Melon	58,500	21,126,226	745,083	1,483,167
Schinziophyton rautanenii				
Manketti	-	19,677,684	197,208	42,597
Parinari curatellifolia				
Parinari	-	36,516,431	1,774,250	2,365,667
TOTAL	12,121,491	3,428,962,767	9,247,649	14,537,264

The aim of this national survey will be to create a database based on the indigenous knowledge of Edible Indigenous Fruits which are commonly used by the community, as sources of food, generating income and some are used as medicinal plants. The overall aim of this fieldtrip was to interview local people in the Ohangwena and Oshikoto region and documents the ethnobotanical uses of indigenous fruits popular in these two regions.

METHODS

2.1. Study Area

The study was carried out in the Ohangwena and Oshikoto region. Ohangwena and Oshikoto are two of the Namibian 13 political regions. Ohangwena is the most densely populated region in Namibia. The population is mostly spread out in rural character with the highest densities in the west. The region is divided into 11 constituencies, namely: Endola, Ongenga, Engela, Oshikango, Ohangwena, Ondobe, Eenhana, Epembe, Omundaungilo, Okongo and the newly established Omulonga constituency. With an area of 10582 km 2 the region stretch along the Angolan boarder to the North, Omusati and Oshana regions to the West, Oshikoto to the South and Okavango to the East. The annual temperature range between 23-34 Celsius degree and the annual rainfall varies between 480 mm and 600 mm. This survey was conducted in Eenhana and Okongo constituencies.

The Oshikoto region was selected on the basis that it is inhabited by people from different ethnic groups: the San, Owambo, Damara/Nama, and Ova Herero. It has ten constituencies: Oniipa, Onyaanya, Onayena, Olukonda and Omuntele, Okankolo, Engodi, Genius, Omuthiya and Tsumeb constituencies. It was chosen as a study site because it could provide data useful for design of proper data collection instruments for a country-wide baseline study for the indigenous fruits in Namibia. This survey was conducted in Onayena constituency.

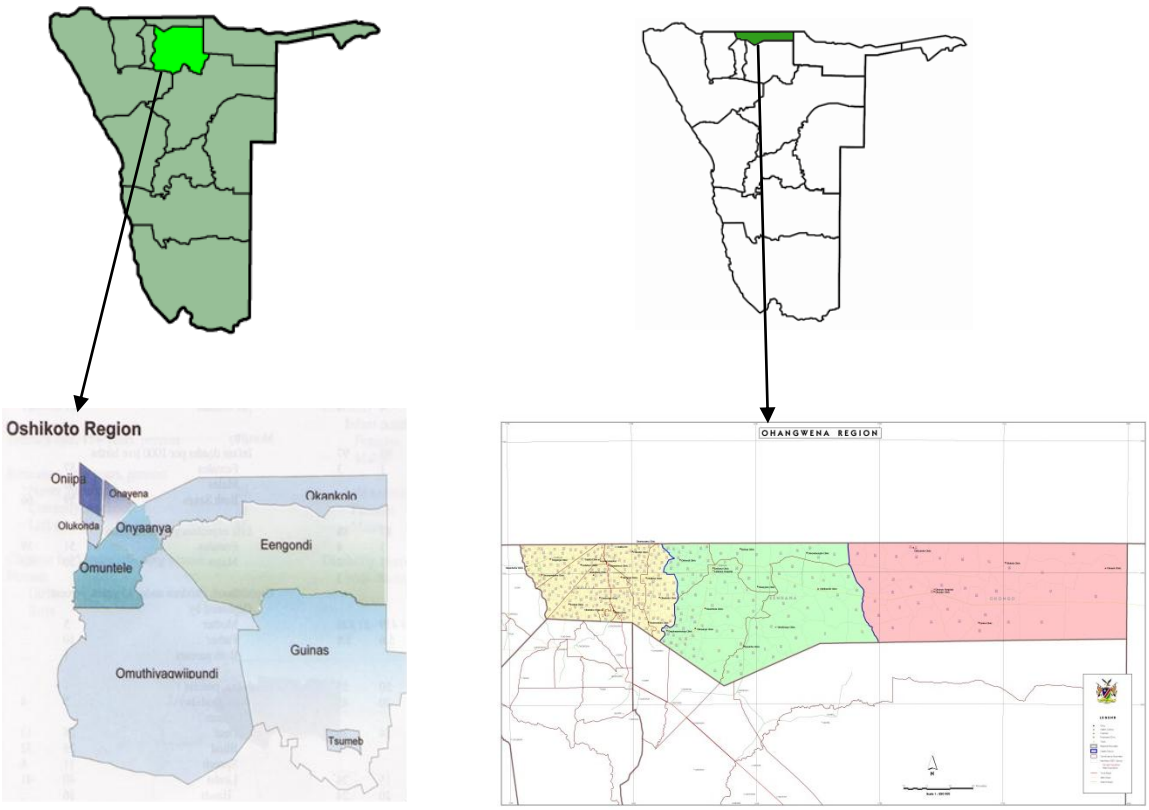

Figure 3 shows the map of the two regions with their constituencies

2.2. Data Collection

There was only one research team; this team covered three constituencies in Ohangwena region ; Okongo Constituency (Okongo, Ondema, Omauni1, Omauni 2 and Efinde villages), Eanhana Constituency (Ondingwanyama and Onambutu villages) and Ondobe Constituency (Ondeihaluka village). In Oshikoto region; only one constituency; Onayena constituency (Oniiwe A, oniiwe B, Oniihwa A and Oniihwa B villages).

An official permit application (Annex 1) to collect plant specimens was sent to the Ministry of Environment and Tourism. The permit (Annex 2) was obtained after six months from the application date.

Before research activities were initiated, regional council and town council were both visited to inform them about the field trip research background and the research activities at the MRC of UNAM. Official letters were sent from MRC-UNAM to Ohangwena Regional Council Office (annex 3) and Oshikoto Regional Council Office (annex 4). An official permission letters from the Regional Council Offices were sent to the respective village's headman (annex 5). It was quite interesting to learn that the people in the villages are protected and they cannot disseminate information concerning the research questionnaires without permission from the headman or their respective councilors.

Before the interviews started; the team leader gave an overview of the objective of the research field trip to the local community in some villages (figure 4)

Fig 4 Research team introducing the objectives of the research to the local community

For the specimens collection; Mrs. Sanette Potgieter was responsible for recording the GPS coordinates and collected a representative specimen for each plant (Annex 6) (figure 5).

Fig 5. Preparation of plant specimen

Ms. Lusia Heita and Mr. Werner Embashu were responsible for interviewing the local people (figures 6&7).

Fig 6 Group interview

Fig 7 Field Interview

Mr. Simeon Mukululwa was also assisting in the interview process and collecting the specimens' local names.

Fig 8 Individual interview

Dr. Ahmad Cheikhyoussef was the project coordinator and quality control process facilitator during this field trip. The questionnaires focused on the investigation of local name of the species, which parts are used, traditional product(s) made from the tree, management practice, abundance, traditional fruits health and social value(s) and how people perceived the decline/increase of the species in time. To get an estimate of the presence index for the species in

the survey area (mainly in house yard and farmland), each informant was asked whether he/she had one individual indigenous fruit tree on their farms or lands and asked to indicate the part of the plant that was used most frequently.

3.3. Ethnobotanical Survey

A structured questionnaire was used for interviews. Interviews were conducted in the local language, Oshiwambo. Only a few were done in English. Interviews were done individually and group interviews were taken with exceptional cases were people were found gathered at one place. The GPS coordinates of the villages where interviews were held were recorded as well. Plant specimens were collected and preserved in a plant press as voucher specimens were sent to the NBRI for scientific identification (table 4). Each of the plants received a voucher specimen number and voucher specimen/collection forms were completed for the plants that were collected, digital photos were also taken.

3.4. Data Analysis

After listing, the indigenous fruits plant species were ranked based on frequency of being mentioned as most important. The number of times each species was cited as most important amongst the listed five species served as our priority index. Species cited between 3-4 times were assigned moderate priority; 5-6 times, high priority and 7 or more times were highest priority criteria. Only plants cited as most important for three or more times were considered in the ranking (Njoroge et al., 2010).

3. FINDINGS

A total of 65 interviews were conducted in total; with 40 interviews in Ohangwena region and 25 in Oshikoto region. Thirty six plant specimens were collected of which 24 are from Ohangwena and 15 from Oshikoto region (table 3&5).

Table 3 Plant specimens from Ohangwena & Oshikoto regions with their indigenous names & GPS coordinates.

Voucher Number	Date	Indigenous name	Collection site	GPS S	GPS E
IKSTF 001	24/10/2011	Eembe	Okongo	17 33 980	017 12 562
IKSTF 002				17 34 020	017 12 510
IKSTF 003					
IKSTF 004	24/10/2011	Omunkete	Okongo	17 33 883	017 12 303
IKSTF 005	24/10/2011	Omukete	Okongo	17 33 542	017 12 680
IKSTF 006	24/10/2011	Omupeke	Okongo	17 33 542	017 12 680
IKSTF 007	24/10/2011	Omushi	Okamanya	17 31 895	
IKSTF 008	24/10/2011	Omipwaka	Okamanya	17 31 897	017 11 774
IKSTF 009	24/10/2011	Omufimba		17 30 535	017 10 110
IKSTF 010	25/10/2011	Omuuni			
IKSTF 011	25/10/2011	Omushe			
IKSTF 012	25/10/2011	Omukete			
IKSTF 013	25/10/2011	Omankete		17 32 485	017 43 832
IKSTF 014	25/10/2011	Omuhango		17 32 518	017 43 826
IKSTF 015	25/10/2011	Okapukulu		17 32 519	017 43 827
IKSTF 016	25/10/2011	Omupombo		17 32 548	017 43 836
IKSTF 017	25/10/2011	Omupeke			
IKSTF 018	25/10/2011	Omunghete		17 32 559	017 43 774
IKSTF 019	25/10/2011	Omutyaalale	Omauni 1	17 31 680	017 40 341
IKSTF 020	25/10/2011	Unknown	Omauni 1	17 31 676	017 40 347
IKSTF 021	25/10/2011	Omashe	Omauni 1	17 31 676	017 40 347
IKSTF 022	25/10/2011	Eembud-hakatutu	Omauni 1	17 31 676	017 40 347
IKSTF 023	26/10/2011	Marula	Ondikwanyama	17 31 116	016 20 376
IKSTF 024	26/10/2011	Okandong-ondongo (male)		17 31 297	016 19 813
IKSTF 025	26/10/2011	Marula		17 56 268	016 16 876
IKSTF 026	27/10/2011	Eembe		17 56 258	016 16 867
IKSTF 027	27/10/2011	Eeshe		17 56 272	016 16 850
IKSTF 028	27/10/2011	Eenyandi		17 56 306	016 16 852

IKSTF 029	27/10/2011	Eenyandi		17 56 312	016 16 877
IKSTF 030	27/10/2011	Eenyandi		17 56 334	016 16 876
IKSTF 031	28/10/2011	Ostliyugulu	Oniiwe A	17 56 323	061 16 877
IKSTF 032	28/10/2011	Eenyandi	Oniiwe A	17 56 316	016 16 886
IKSTF 033	28/10/2011	Eembe	Oniiwe A	17 56 214	016 16 835
IKSTF 034	28/10/2011	Marula (male)	Oniiwe A	17 54 085	16 12 530
IKSTF 035	28/10/2011	Omunkete	Oniiwe A	17 54 081	016 12 523
IKSTF 036	28/10/2011	Marula (female)	Oniiwe A	17 54 033	061 12 533
IKSTF 037	28/10/2011	Marula (male)	Oniiwe A	17 54 031	016 12 543
IKSTF 038	28/10/2011	Eeshe	Oniiwe B	17 55 505	016 18 545
IKSTF 039	28/10/2011	Ongunzi	Oniiwe B	17 55 451	016 18 483
IKSTF 040	28/10/2011	Eendunga	Oniiwe B		
IKSTF 041	28/10/2011	Oonkunyu	Oniiwe B		

One person assisted the research team in the two regions and received some incentives as a token of appreciation and good will. The majority of the headmans were more cooperative and willing to share their vast knowledge and skills on the traditional uses of indigenous fruits and ethnobotanical uses. However, it was observed that some of the respondents were not so forthcoming in sharing their knowledge as some only gave the name of one plant or two at the most, or they gave the names provided by other people. This was regarded as a disadvantage as a wide variety of plant species/names could not be collected; which may have been caused as a result of fearthatif this knowledge might become known to all. Furthermore, some people feared that researchers might exploit their knowledge and their resources. The majority of the people interviewed were in their thirty's, with the youngest being 18 years old and the oldest being 98 years old. Within the 65 respondents; 54% women, 38% men and 8% both in group interviews (table 4).

Table 4 Distribution and percentages of respondents in this study

Village	Region/constituency	No. of Respondents	No. of Men	No. of Women	No. of Group (Both)
Okongo	Ohangwena/ Okongo	8	1	6	1
Ondema	Ohangwena/ Okongo	2	0	2	0
Omauni1	Ohangwena/ Okongo	3	2	1	0
Omauni 2	Ohangwena/ Okongo	6	1	4	1
Efinde	Ohangwena/ Okongo	7	4	3	0
Ondingwanyama	Ohangwena/ Eanhana	6	1	3	2
Onambutu	Ohangwena/ Eanhana	6	3	3	0
Ondeihaluka	Ohangwena/ Ondobe	2	1	1	0
Oniiwe A	Oshikoto/ Onayena	7	2	5	0
Oniiwe B	Oshikoto/ Onayena	6	5	1	0
Oniihwa A	Oshikoto/ Onayena	7	2	5	0
Oniihwa B	Oshikoto/ Onayena	5	3	1	1
Total		65	25	35	5
Percentage		100%	38%	54%	8%

Most of the respondents indicated that their knowledge on indigenous fruits was learnt mainly through their parent expect few have reported that their knowledge were learnt from some people in their villages and schools. Almost all of the respondents reported that the indigenous fruits and their products have social values such as it is presented to guests at special ceremonies, weddings, etc. In addition to their social values; health values have been reported also especially when someone having flu, it can be given as a juice (Marula juice). Additionally they are rich

source of vitamins and can combat malnutrition. Some have reported that indigenous fruits used as first aid before seeking hospital. Some people depend on these fruits and their by-products to get income, for example Distilled liquor from Eembe (*Berchermia discolor*), Palm fruits (common practice in Oshikoto region). Most of the peoples reported that the traditional beer and wines are the main products made from these fruits.

In this study; 38 specimen were collected belong to 18 genuses and 23 species, their scientific names are listed in table 5.

Table 5 Scientific names of the collected indigenous fruits specimens in this study

Specimen voucher number	*Scientific Name*
IKSTF 1	*Berchemia discolor (Klotzsch)Hemsl.*
IKSTF 3	*Ziziphus mucronata Willd.*
IKSTF 4	*Schinziophyton rautanenii (Schinz)Radcl.-Sm.*
IKSTF 5	*Berchemia discolor (Klotzsch)Hemsl.*
IKSTF 6	*Ximenia caffra Sond. var. caffra*
IKSTF 7	*Guibourtia coleosperma (Benth.) J.Léonard*
IKSTF 8	*Diospyros mespiliformis Hochst. ex A.DC.*
IKSTF 8	*Strychnos pungens Soler.*
IKSTF 9	*Dialium engleranum Henriq.*
IKSTF 10	*Strychnos spinosa Lam.*
IKSTF 11	*Grewia flavescens Juss. var. flavescens*
IKSTF 12	*Ziziphus mucronata Willd.*
IKSTF 14	*Grewia flava DC.*
IKSTF 15	*Ximenia americana L. var. microphylla Welw. ex Oliv.*
IKSTF 16	*Searsia tenuinervis (Engl.) Moffett*
IKSTF 17	*Ximenia americana L.*
IKSTF 18	*Schinziophyton rautanenii (Schinz)Radcl.-Sm.*
IKSTF 19	*Annona stenophylla Engl. & Diels subsp. nana (Exell) N. Robson*

IKSTF 20	*Pygmaeothamnus zeyheri (Sond.)Robyns var. zeyheri*
IKSTF 21	*Grewia flavescens Juss. var. flavescens*
IKSTF 22	*Ancylanthos rubiginosus Desf.*
IKSTF 23	*Sclerocarya birrea (A. Rich.)Hochst. subsp. birrea*
IKSTF 24	*Salacia luebbertii Loes.*
IKSTF 25	*Sclerocarya birrea (A. Rich.)Hochst. subsp. birrea*
IKSTF 26	*Berchemia discolor (Klotzsch)Hemsl.*
IKSTF 27	*Grewia schinzii K. Schum.*
IKSTF 29	*Diospyros mespiliformis Hochst. ex A.DC.*
IKSTF 30	*Diospyros mespiliformis Hochst. ex A.DC.*
IKSTF 31	*Diospyros lycioides Desf.*
IKSTF 32	*Diospyros mespiliformis Hochst. ex A.DC.*
IKSTF 33	*Berchemia discolor (Klotzsch)Hemsl.*
IKSTF 34	*Sclerocarya birrea (A. Rich.)Hochst. subsp. birrea*
IKSTF 35	*Schinziophyton rautanenii (Schinz)Radcl.-Sm.*
IKSTF 36	*Sclerocarya birrea (A. Rich.)Hochst. subsp. birrea*
IKSTF 38	*Grewia schinzii K. Schum.*
IKSTF 39	*Boscia albitrunca (Burch.)Gilg & Benedict*
IKSTF 40	*Hyphaene petersiana*
IKSTF 41	*Ficus sycomorus*

Results regarding indigenous people perception on declining local indigenous fruits revealed that 56.25% of the respondents reported that indigenous fruits were declining (Figure 10). Some of the reasons contributing to this phenomena are mainly the climate change effects which include; drought, cold and freezing, natural disasters, deforestification and heavy rain. Other factors are human and animal conflict such as housing, fire wood and farming. Only a 42.18% indicated that the indigenous fruits populations are increasing, while only 1.56 % recognized the fact that indigenous fruit trees number is constant. During the field survey some of these respondents remarked that as long as there are rains, indigenous fruits cannot be threatened. Other reasons on

the increasing status are the fertility of the soil, cultivation trails and protection & domestication efforts from local communities and government ministries.

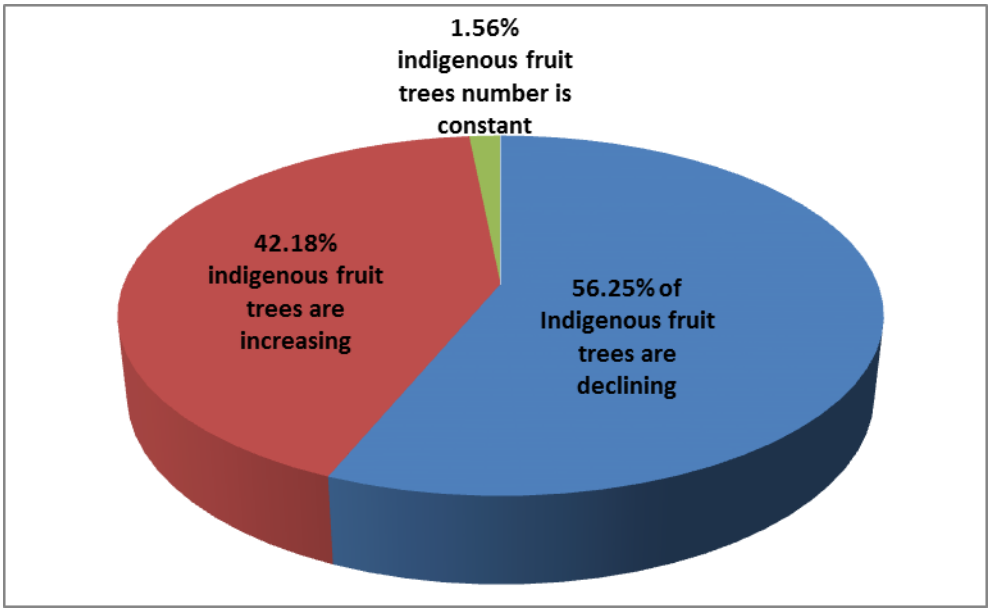

Figure 10 Knowledge index regarding indigenous fruit threat among local people in Ohangwena and Oshikoto regions, Namibia (figures refer to percentage of respondents).

On the abundance of the indigenous fruits; most of the respondents indicated that most of the indigenous fruit trees are scattered and presently safe (36.85%) on the other hand; some that are threatened (15.80%) and 36.85 % are doubtful about the abundance of these trees in their villages.

Regarding to the management practices to improve the production of these indigenous fruit trees; 38.60 % reported that there are some efforts on management practices; on the other hand 61.40 % reported there are no management practices on the indigenous fruit trees in their areas.

On the ethnobotanical knowledge and ethno-pharmacological uses of the indigenous fruits, the following diseases and ailments have been reported to be treated: toothache, diarrhea, cough, tonsillitis, burns, skin allergy, stomach ache, snake bit, constipation, etc. Very few have mentioned

an ethno veterinary uses of these fruits, e.g. the use of the *Ziziphus mucronata* roots to treat diarrhea in cattle, the bark of eembe (Berchemia discolor) to treat calf weakness.

Many products have been reported to be done from indigenous fruits, these include: juice like Marula juice, traditional beer and wine like monkey orange, eembe and marula, oil like marula and Ximenia oils. Some respondents have reported on adding these fruits to their local porridges and others have reported that they prefer to dry them and eat it in scare and food shortage times.

4. Challenges encountered

It was difficult to get to some of the villages, for example Efinde village; we got lost several times. Some villages are so remote with poor road infrastructure and harsh terrains making it difficult to access them. This could also be ascribed to the dense forest especially in Okongo constituency. Some of the community people interviewed were reluctant to give out information without any sort of incentives in return.

5. Recommendations

The following recommendations are needed to be considered:

- Detailed research studies have to be conducted in these regions in the future because of the rich flora in Ohangwena especially during the season of bearing fruits.
- Early agreements with governor, councilors and headman are to be made before research is conducted.
- Incentive based protocols are encouraged for further collaboration between the local communities and scientific institutions to develop products and value addition of fruits.

- Local people in the studied areas may require capacity building and awareness regarding indigenous conservation status, domestication strategies as well as appropriate methods of propagation.
- Make findings available to the community where research is conducted by giving regular feedback to these communities.

6. CONCLUSIONS

A total of 65 interviews were conducted with 40 interviews in Ohangwena region and 25 in Oshikoto region. Thirty eight plant specimens were collected for scientific identification and further investigations; these belong to 18 genuses and 23 species. A significant number of these plants were used for healing humans and animals. All respondents reported that the indigenous fruits and their products have social and health values. Regarding to the perception of the indigenous people on declining local indigenous fruits; results revealed that 56.25% of the respondents reported that indigenous fruits were declining. Only a 42.18% indicated that the indigenous fruits populations are increasing, while only 1.56 % recognized the fact that indigenous fruit trees number is constant. On the abundance of the indigenous fruits; most of the respondents indicated that most of the indigenous fruit trees are scattered and presently safe (36.85%) on the other hand; some that are threatened (15.80%) and 36.85 % are doubtful about the abundance of these trees in their villages. Management practices to improve the production of these indigenous fruit trees have been reported. The establishment of a database for indigenous fruits and their ethnobotanical uses would reduce the chances of this valuable information to disappear, whilst also contributing to the awareness of the conservation of these plants. Sharing IK within and across communities will also help enhancing cross-cultural understanding and promote the cultural dimension of development.

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