

Post-harvest Handling, Processing and Marketing of Sisal Fibres and Crafts in the Shiselweni District of Swaziland

¹T.T. Mkhonta, ²P.E. Zwane, ¹J.M. Thwala and ³M.T. Masarirambi

¹Department of Chemistry, University of Swaziland, P. Bag 4, Kwaluseni,

²Department of Consumer Sciences,

³Department of Horticulture, University of Swaziland, P.O. Luyengo M205, Swaziland

Abstract: The aim of the study was to assess current status of post-harvest handling, processing and marketing of sisal fibres and crafts in the Shiselweni district of Swaziland. A variety of natural fibre based products are made in Swaziland using *Agave sisalana* for the local market and for export. However, there is limited information pertaining to post-harvest handling, processing and dyeing of plant fibres in the Shiselweni region of Swaziland. A qualitative and quantitative study using the Participatory Rural Appraisals (PRAs) approach and questionnaires was carried out with two groups of participants from two parts of the Shiselweni region. Information gathered was analyzed, to capture the background of the participants, evaluate their methods of fibre harvesting, extraction, spinning, weaving and dyeing and to document challenges faced by the participants. The findings revealed that the sisal trade was dominated by women. The women used skills passed from generation to generation and generated profits in the business until the demand for natural fibres decreased. Fifty two percent of the women from Lavumisa were no longer satisfied with the returns of their trade, while 80% in Nhlanguano felt the same way. However, both groups felt that working with sisal had improved their household food security to a certain extent. Further findings revealed that there was a great need to train the concerned women in product development, marketing skills, environmental conservation and entrepreneurship.

Keywords: Conservation, climate change, market, plant fibres, product development, rural communities

INTRODUCTION

Swaziland is a country in Southern Africa, lying between Mozambique and South Africa. The country is located at the geographic co-ordinates 26°30' south latitude and 31°30' east longitude (Vilakati, 1997) and has an area of 17,364 km², of which 160 km² are water bodies. It contains four separate geographical regions from west to east namely Highveld, Middleveld, Lowveld and Lubombo (Vilakati, 2005). Swaziland offers a wide variety of landscapes, from the mountains along the Mozambican border to savannas in the west of the mountains that border Swaziland and Mozambican and rain forest in the northwest. The terrain largely consists of mountains and hills, with some moderately sloping plains. The lowest point is the Great Usutu River, at 21 m above sea level. Several other rivers flow through the country, such as the Komati and Mbuluzi (Fig. 1).

Swaziland is divided into four districts with a population of 1,126 million people (Thompson, 2009), where 52% of the population is under the age of 20 years and 78% resides in rural areas. The districts are Hhohho, Manzini, Shiselweni and Lubombo and these



Fig. 1: Map of Swaziland showing districts, rivers and study areas

are further subdivided into Tinkhundla. The districts comprise of Title Deed Lands (TDLs), where a bulk of high value crops are grown (sugar, forestry and citrus) and are characterized by high levels of investment and irrigation and high productivity. Nevertheless, the majority of the population, about 75%, is engaged in subsistence agriculture on Swazi Nation Land (SNL),

which, in contrast, suffers from low productivity and investment (Vilakati, 2005).

Swaziland remains classified as a lower-middle income country. However, it faces challenges similar to low-income economies. The past several years have seen wavering economic growth as the small economy is strongly affected by changing climatic conditions and external factors. Given that an estimate of about two-thirds of the population lives in the rural areas, where a mixture of subsistence and commercial farming is practiced, the increase in droughts during the last few decades has resulted in severe impacts on the population and the environment. Poor availability of water for irrigation is a major constraint to smallholder crop production and in years of low rainfall, harvests plummet (Thompson, 1999). Of important concern has been a decline in the production of the staple maize in recent years partly due to the impact of climate change and thus further threatening food security in the Kingdom (Oseni and Masarirambi, 2011).

In 2000, the Kingdom of Swaziland signed the United Nations Millennium Declaration, embracing the Millennium Development Goals (MDGs). These goals are centred on important development priorities pertaining to poverty alleviation, education, gender equality, health, HIV/AIDS, environmental sustainability and a global partnership for development. Recently the country has been affected by high unemployment levels, poverty, high HIV/AIDS prevalence, as well as the global economic crisis, which makes achieving the MDGs more challenging (GOS, 2010).

As a small landlocked country with limited domestic markets, Swaziland's economic performance is dependent on export oriented industries and is influenced by global trends, commodity prices, capital and aid flow (Thompson, 1999). With an estimated 40% unemployment rate, Swaziland's need to increase the number and size of small and medium enterprises and attract foreign direct investment is acute. Small scale industries are important for providing local employment. Small scale industries use traditional methods such as weaving and carving to produce relatively high quality goods from grasses, reeds and wood (Mciza *et al.*, 2008).

Swaziland is endowed with a wonderful biodiversity of indigenous plants and trees and significant sector of the population relies on the sale of handicrafts made from locally available raw materials such as sisal baskets, doormats, wooden birds, carved masks, leatherwork and shields, toy drums and grass baskets (Zwane *et al.*, 2011a; Hall, 2012). Sisal is the world's greatest industrial crop, the chief fibre plant and in Swaziland it grows wild as a weed with a strong resilience to harsh climate conditions and provides a widespread, ready source for natural fibres (Pandey, 2010).

In Swaziland, rural women are known for creating fine pieces of art, jewellery and decorations from sisal, grasses and reeds. Natural and synthetic dyes are used for making a variety of shades in handicrafts. A variety of indigenous trees and herbs are available in Swaziland and can be used as sources of natural dyes. The renewed interest in history and traditions on one hand and increasing appreciation for nature in general have contributed to the use of natural dyes in craft development. As an entity, craft oriented operations comprise a key sector of the economy, producing a diversity of goods for local and export markets while providing employment and generating income.

The aim of the study was to establish the current practices in harvesting, post-harvest handling and fibre processing of sisal and the problems encountered in product development using the plant fibres with a view to explore the use of enzymatic treatment of the plant fibres (*Agave sisalana* and *Ananascomosus*) for the development of environmentally friendly products in future. In addition, information on dye plants and dyeing methods used in plant fibre products was gathered. There is hope to strengthen the rural groups or individuals and address constraints to improved productivity, particularly the need to introduce new systems of production that will yield relatively high quantity and quality products.

This study targeted poor rural women (both young and elderly) from the Shiselweni region, with the hope of making them self reliant and able to meet the needs of their families in the near future. Unemployment in the country has a strong rural dimension, those residing in rural areas are much more likely to be unemployed than those living in urban areas. Moreover, a wide range of employment indicators reveal that men possess noticeably better employment prospects than women (GOS, 2010). This group was ideal for the study because in most cases, women are the primary care givers, whether they are able or not. Additionally, women have a less chance to seek formal employment in urban areas because most of the time they are left behind to look after the home in rural areas, thus the need to empower them.

The objective of the study was to establish current practices in harvesting, post-harvest handling, fibre processing and the problems encountered in product development using plant fibres.

MATERIALS AND METHODS

Site description: A qualitative and quantitative study using Participatory Rural Appraisals (PRAs) approach and questionnaires was carried out in Nhlanguano and Lavumisa areas in the Shiselweni district. The Shiselweni district is located in the southern part of the country (Fig. 1). The Shiselweni district consists of the Highveld and Lowveld agro-ecological regions.

Nhlangano is located in the Highveld with an average altitude of 1200 m. Annual rainfall is highest on the Highveld, between 1,000 and 2,000 mm depending on the year (Vilakati, 2005). Highveld average temperature is slightly over 16°C, with a humid near- temperate climate while the Lowveld may record temperatures around 40°C in summer (Vilakati, 2005). Lavumisa is located in the Lowveld at around 225 meters altitude. Having a sub-humid and tropical climate, the Lowveld receives around 750 to 1150 mm per annum (Vilakati, 2005). The Lowveld of Swaziland is less populated than other areas and presents a typical bush of thorn trees and grasslands.

Data collection: Part of this study was exploratory and descriptive in nature. The PRAs were conducted in Nhlangano and Lavumisa in the Shiselweni region of Swaziland. They provide information to outsiders who wish to understand how the community uses and manages its resources and they provide information for the collective community to evaluate its resource management practices (Anyaegebunam *et al.*, 2004). The target populations consisted of two groups of women with ages ranging from late twenties to early sixties. The two separate groups of women working with sisal were identified in the Shiselweni region with the help of a handicraft official under the Ministry of Commerce Industry and Trade based in Nhlangano. Each group was visited twice, first for open ended discussions as part of PRAs and then for the formal interviews using questionnaires. The women were assured of confidentiality and their names were not used at any point in the study. As part of the PRAs, consultative meetings were conducted with the women and information was used to create structured questionnaires. The women had information on methods of fibre extraction, product development and also market potential of their products. The formal questionnaires which were validated by three experts in Social Sciences and Agriculture faculties of the University of Swaziland were used to collect data from the participants.

RESULTS AND DISCUSSION

Consultative meetings as part of PRAs revealed that through sales of handicrafts, the women from Shiselweni earned money needed to buy basic food needs and clothing, access medical care and pay school fees. A wide range of the products are made from natural fibres and served as the rural women's source of livelihood (Zwane and Masarirambi, 2009; Zwane *et al.*, 2011a, b). However, due to the lack of innovative support and market availability most women had quit the trade. The regions of Lubombo and Shiselweni are the poorest in the country, requiring priority in

development interventions (GOS, 2010). Results will be used to help improve the technology, finishes of products, product development and other applicable marketing measures as adopted by other producer countries. Results will also help develop a work plan for increasing the competitiveness of the fibre industry by attracting Foreign Direct Investments (FDI) and Joint Venture (JV) partners to help in the improvement of technology and volume production. There is an avenue for a large global market with a potential to provide employment to large populations in rural, as well as semi urban and urban areas.

Lavumisa group survey: On the 24th day of August 2012 a group of 21 women were consulted at Lavumisa in the company of the herd-man of the area and another community official. Most of the women were temporarily employed in the nearby sugarcane plantations for meager earnings. The people were welcoming and the herd-man narrated the background history on the involvement of the women in the sisal trade. He explained how their parents raised them through funds generated working with sisal. All the women present had at some point quit the trade and were no longer working with sisal due to drop in sales. Most of the women stopped trading because they were good at harvesting and extracting sisal fibres but poor at weaving. They explained that they used to make good money, compared to the on and off jobs they had at the sugarcane fields. Eighty four percent reported that in the sisal trade improved their household income and 22% reported that the returns were actually good. It was deliberated that these women needed to be more organized by forming an association and the government official promised to offer assistance in that regard.

Nhlangano group survey: On the 21st day of September 2012 a group of eight women were available for consultation at Ngwabi pre-school in Nhlangano. More were expected, but they were excused by their colleagues because of funerals and illnesses. The women reported that they had been working with fibres since their early years. Eighty percent of the women reported they had been handling sisal for approximately 30 years. The women had no formal organization but had in the past been assisted by the formal handicraft sector of the Swazi government who transported them to buy raw material and also linked them with Swaziland Trading House (when still operational) who bought some of their products. The women also related how a white man from Mantenga Crafts in the Cultural village at Ezulwini used to buy a wide range of their products until for some unknown reason he stopped buying. Most of their customers now supported organized centres such as Tintsaba Crafts and with a

Table 1: Age ranges for surveyed women from Shiselweni region

Age	20 (-)	21-30	31-40	41-50	51-60	61 (+)
Lavumisa (N = 21)	0	4	4	8	2	3
Nhlangano (N = 8)	0	0	2	2	1	3
Percentage (%)	0	14.23	21.43	35.71	10.72	21.43

Table 2: Marital status for surveyed women from Shiselweni region

Marital status	Lavumisa		Nhlangano	
	Frequency (N = 21)	Percentage (%)	Frequency (N = 8)	Percentage (%)
Married	14	66.67	4	50
Widowed	4	19.05	3	37.5
Divorced	0	0	0	0
Single	3	14.29	1	12.5

Table 3: Education status for surveyed women from Shiselweni region

Education status	Lavumisa		Nhlangano	
	Frequency (N = 21)	Percentage (%)	Frequency (N = 8)	Percentage (%)
Primary	9	42.86	2	25
Secondary	5	23.81	3	37.5
High	0	0	0	0
Tertiary	0	0	0	0
Informal	0	0	0	0
None	7	33.33	3	37.5

Table 4: Employment status for surveyed women from Shiselweni region

Occupation	Lavumisa		Nhlangano	
	Frequency (N = 21)	Percentage (%)	Frequency (N = 8)	Percentage (%)
Employed	6	28.57	1	12.5
Vendor	3	14.29	4	50
Farmer	1	4.76	0	0
Volunteer	1	4.76	0	0
Unemployed	10	47.61	3	37.5

Table 5: Monthly household income for surveyed women from Shiselweni region

Household Income E	Lavumisa	Nhlangano	Total frequency	Percentage (%)
	frequency (N = 21)	frequency (N = 8)		
0-200	0	1	1	3.57
<200-500	9	5	14	50.0
<500-1000	2	2	4	14.29
<1000-2000	2	0	2	7.14
<2000-5000	1	0	1	3.57
N/A	7	0	7	25.0

Table 6: Household assets owned by surveyed women from Shiselweni region

Assets	Lavumisa	Nhlangano	Total frequency	Percentage (%)
	frequency (N = 21)	frequency (N = 8)		
Cattle	6	5	11	39.29
Goats	8	2	10	35.71
Chicken	17	5	22	78.57
Pigs	4	1	5	17.86
Sheep	0	0	0	0

Table 7: Sources of fuels used by surveyed women from Shiselweni region

Fuel source	Lavumisa	Nhlangano	Total frequency	Percentage (%)
	frequency (N = 21)	frequency (N = 8)		
Electricity	1	1	2	7.14
Gas	1	0	1	3.57
Paraffin	10	4	14	50.0
Coal	0	0	0	0
Firewood	19	6	25	89.29

hint of regret they mentioned that such monopoly limited their profit making opportunities and that led to the group disintegrating. The women knew how to transform their fibres in terms of spinning, dyeing and weaving. The women mentioned that they sold their own products at a fixed price in the local market. With the problems of market availability, 80% of the women stated that the income was unsatisfactory even though it did to a certain extent improve their household food security.

Socio-economic background: Most of the respondents were middle-aged with 35.7% between the ages of 40 and 50 (Table 1). A majority of the women were married while 19.1% were from Lavumisa and 37.5% from Nhlangano were widowed (Table 2). This rendered them household heads and seeking employment in urban areas would mean abandoning their homesteads which they could not do. Through the sisal project, they were able to support their families without having to leave their homes. In Lavumisa, 66% of the women had the opportunity to formal education, the majority being at primary level and the remainder had no formal education at all. In Nhlangano, 37.5% of the women had never been to school (Table 3). About 29% of the women from Lavumisa were employed whereas only 12.5% were employed in Nhlangano (Table 4). Thirty three percent of those employed, mostly in sugarcane fields, earned less than E300.00 per month (1US\$ = E9.00). The remainder of the women were vendors and others did volunteer work at aid organized soup kitchens. The women had little or no assets and yet were supporting households of 6.7 members on average. Thirty nine percent of the households owned cattle. With more than 50% earning a total household income of less than E 500.00, most households reported use of firewood (89.3%) as a source of fuel (Table 5 to 7).

Skills and handling: The women from Lavumisa travelled as a group for safety purposes, to an abandoned sisal plantation now under Tibiyo Taka-Ngwane parastatal. Women from Nhlangano however, did not usually harvest their fibre but bought it mostly from Manzini, instead of securing raw material from distant mountain sites. The women generally harvested the plants without tools while about 14% used tools such as knives to cut out the sword shaped leaves from the plant. In the fields, they used to collect the plants by pulling the middle younger leaves which they packed in sacks and carried home on their backs. They explained

Table 8: Skills and post-harvest handling and processing of sisal fibres

Skills	Lavumisa		Nhlngano	
	Frequency (N = 21)	Percentage (%)	Frequency (N = 21)	Percentage (%)
Dyeing	6	28.57	7	87.50
Spinning	9	42.86	8	100
Weaving	2	9.530	7	87.50



Fig. 2: Sisalfibres, bowls and earrings

that they used the inner leaves because they were easier to extract fibres than the outer, older leaves.

Countries such as Tanzania with advanced sisal trade markets, harvest even the older leaves, which yields good fibre without destroying young plants (Lock, 1969). Also, convenient decorticators that would ensure faster, efficient and sustainable harvest may be used (Boguslavsky *et al.*, 2007; Zwane and Masarirambi, 2009). At home, women sorted out the leaves according to size, removed the outer greener leaves by hand and thorns with knives. Fibres suitable for processing into yarns need to be fairly uniform in shape and size (Needles, 1986). They extracted the fibre by putting the leaves between a piece of flat wood and aluminum cans. Participant women reported that they protected their skins from the plant's stinging sap properties by wearing long sleeve blouses during extraction. Plant fibre waste was thrown in the fields or compost heaps, which are means of safe and eco-friendly waste management in this era of potentially irreversible climate change.

After collection and extraction, sisal fibres were washed and dried on rafters indoors, to prevent discoloration, although sun drying was still widely used in some countries (Lock, 1969). Fibre becomes discolored, turning to a creamy white when exposed to strong sunlight, due to action of ultraviolet light on lignin component of fibre (Lock, 1969). They also reported that when fibres were not properly dried, they became mouldy due to microbial growth. Proper drying was important as fibre quality depended largely on moisture content. The raw material was stored in well-ventilated spaces to maintain quality and ensure subsequent quality crafted products. Once properly dried they packed the fibres in plastic bags, cartons or sacks. Dyeing of plant material followed whenever necessary and then drying was done again. Sisal yarns were spun by rolling on the thigh by hand.

Results shown in Table 8 reveal that about 43% of the women from Lavumisa could spin the fibre into

yarn while only 9.5% could weave their fibre before travelling to Manzini to sell it at the city market. On the contrary, a large percentage of the women from Nhlngano dyed, spun and wove their fibre into beautiful products.

Sisal harvesting, fibre extraction and product making in Swaziland is a labor intensive process, with use of very low level of technology. No pre-treatment or post-treatment was done by the women on the fibres to improve quality of subsequent products. This includes chemical retting methods using alkalis, mild acids and enzymes for fibre extraction (Reddy and Yang, 2005). The alkali treatment removed natural and artificial impurities which improved the fibre adhesion. It may destroy the hydrogen bonding in cellulose hydroxyl groups of the fibre, thereby making them more reactive to the functional group of auxiliaries such as dyes and resins for finishing purposes (Mokhtar *et al.*, 2007). Enzymatic catalysis selectively focuses on the specific substrate composition which places enzymatic procedures into the cleaner production tools category (Marek *et al.*, 2008). Such chemical treatments would help increase the value of their products.

Fibres and fibre products: All the women involved in the survey worked with sisal and a wide range of products such as coasters, tablemats, bowls, pots and baskets were made from the plant fibre (Fig. 2). Despite the challenges of the sisal trade faced in the southern region, a few women remained in the business mainly because they possessed more than one skill, such as making traditional regalia, or weaving other products from reeds and grasses. About 21% also used grasses and reeds for their craftwork. Plants such as *Cyperus latifolius* (*likhwane*), *Scirpus inclinatus* (*inchoboza*), *Coleochloa setifera* (*lutindzi*), *Ascolepsis capensis* (*umuzi*), *Phragmites australis* (*umhlanga*) and *Phoenix reclinata* (*lisundvu*) were used by the women for other craft products (Compton, 1976; Dlamini and Rycroft, 1981). Craft products included sleeping mats, table coasters, brooms, wall hangers, beer strainers, head gear, grass skirts and chicken baskets. About 11% of the women, from Lavumisa also harvested cotton. However, severe drought conditions imposed adverse effects on cotton production and the area under cotton has been considerably reduced (Townsend, 1999). Fibre products were sold in town and tourist attraction sites. Most of the products have cultural uses, such as in funerals, cleansing ceremonies and traditional weddings. Some plants used as raw material for fibre products and crafts are listed in Table 9.

Dyes and dye plants: Both synthetic and natural dyes were used for dyeing of sisal fibres the women from a and after sisal fibres (Table 10) Lavumisa used natural dyes (4.76%) whereas the Nhlngano group exclusively used synthetic dyes.

Table 9: Plants harvested for fibre and craft use in the Shiselweni region

Fibre sources	Lavumisa frequency (N = 21)	Nhlangano frequency (N = 8)	Total frequency	Percentage (%)
Sisal	20	8	28	100
Cotton	3	0	3	10.71
Grasses	4	2	6	21.43

Table 10: Types of dyes used by women from Shiselweni region

Type of dye	Lavumisa		Nhlangano	
	Frequency (N = 21)	Percentage	Frequency (N = 8)	Percentage
Natural	1	4.76	0	0.0
Synthetic	4	19.05	1	12.50
Both	1	4.76	6	75.00
None	15	71.43	1	12.50



Fig. 3: Marula plants next to abandoned sisal farm in Lavumisa, Shiselweni district



Fig. 4: Woman and tourist displaying sisal products at the market in Manzini

Synthetic dyes were bought at local outlets. The natural dyes were obtained from locally available plant parts such as bark, leaves, roots or flowers. Table 10 shows different kinds of dyes used by the women.

Popular dye plants were *Sclerocarya birrea* (marula), *Bidens pilosa* (blackjack) and *Allium cepa* (onion) leaves which gave brown, mustard and yellow colors, respectively (Ngubane and Khoza, 1996; Khoza and Ngubane, 1996). The Marula plant (Fig. 3) was popular with the women and it is a multi-use plant. The marula bark was known for medicinal use and to make a dye for basketry and the juice leaves an indelible stain on clothing. Marula (*Sclerocarya birrea* subsp. *caffra*) forms an integral part of the diet, tradition and culture of rural communities in Swaziland (Dlamini, 2010). Traditional (*emaganu*) wine (*buganu*) is produced from marula fruits (Masarirambi *et al.*, 2009).

Direct dyeing methods were used by the women. Dye plants were crushed to maximize extraction of dye

material in a container. Fibre was added and together the contents were brought to the boil and then left to simmer for some time. Fibres were then dried in the sun and made ready for subsequent product development. The women had an idea of mordanting as they mentioned that their ancestors sometimes used ash and table salt in their dye-baths. The passing of technology from one generation to another is called local Indigenous Knowledge Systems (IKS) and is very important in traditional societies (Masarirambi *et al.*, 2010, 2011). Natural dyes can be used on most types of fibre but the level of success in terms of color fastness and colour intensity varies considerably (Wanyana *et al.*, 2011). Nearly all-natural dyes with a few exceptions require the use of mordants to fix them on to the textile substrate. A number of local dye plants were identified by the women and are shown in Table 11.

Market for crafts: In Swaziland, handicrafts are sold mainly by three producer groups namely; individual crafts-people, small-scale handcraft producers and organized large-scale manufacturers (Vilakati, 1997). Tourism offers to the market for local handcraft and agricultural produce (Mciza *et al.*, 2008). The first group comprises mainly rural women, many kiosks are found in hotels and along the main roads of the country where the women sell their wares (Vilakati, 1997). Mantenga Crafts belongs to the last group and most tourists flock to such holdings hence limiting the market for women in the isolated outskirts of their home areas such as Shiselweni. Women produced the goods in bulk and sold them at lower prices to the women who had direct links to the market in Manzini. Manzini is the principal commercial and industrial city and the closest busiest town to Shiselweni.

At the market craft products were sold to locals, tourists (Fig. 4) and international traders who bought the wares in bulk and sold them at a profit in neighboring countries such as South Africa and Mozambique. Tourists bought handcraft items to take home as souvenirs. Some of the products were sold overseas in European countries and the USA through the Swaziland Trading House. The current Queen mother, created the Swaziland Trading House as a means to cut out the middlemen by allowing Swazi artisans to deal with buyers directly through the internet (Hall, 2012). The women reported that even though they were enthusiastic with this venture at first, most of their products ended up unsold because they did not have direct access to the world of Information Communication Technology (ICT) and marketing.

Another concern in the market was the rise of synthetic equivalents, for reinforcements in basket weaving and other purposes which reduced the demand for the unprocessed fibre or yarns. Their clients at the market also preferred ready-to-sell products. Things

Table 11: Local plants from which dyes are extracted in Swaziland

Scientific name	Common name	Siswati name	Part used	Colour obtained	Conservation status
<i>Sclerocarya birrea</i>	Marula	<i>Unganu</i>	Bark	Red	Least concern
<i>Trichilia emetica</i>	Natal mahogany	<i>Umkhuhlu</i>	Bark	Brown	Least concern
<i>Calpurnia aurea</i>	Common calpurnia	<i>Umphendvulo</i>	Leaves	Purple	Least concern
<i>Pterocarpus angolensis</i>	Wild teak	<i>Umvangati</i>	Bark	Red	Least concern
<i>Tagetes minuta</i>	Khaki weed	<i>Nukani</i>	Leaves	Green	Common weed
<i>Sterculia murex</i>	Lowveld chestnut	<i>Umbhaba</i>	Bark	Red-Brown	Near Threatened
<i>Syzgium cordatum</i>	Waterberry	<i>Umcozi</i>	Bark	Red-Brown	Least concern
<i>Bidens pilosa</i>	Black jack	<i>Chuchuza</i>	Leaves	Mustard	Common weed
<i>Rhus dentate</i>	Nana berry	<i>Inhlangushane</i>	Fruit	Yellow	Least concern

Loffler and Loffler (2005) and Dlamini and Rycroft (1981)

were better for the women from Nhlanguano compared to those from Lavumisa, because they had skills in product development, even though they also lacked a good market. Most of them were vendors and owned kiosks in Nhlanguano town centre, which was busier compared to Lavumisa. The need to seek a broader market locally and abroad by the women becomes apparent as soon as time could allow.

Challenges faced by women: Some of the problems associated with the sisal industry include the long time taken for product development, low pace of introduction of new products, inadequate efforts for creating awareness of the advantages of natural fibre and products made from it. Also, the process used to extract sisal had witnessed little change over the years. From this survey, it became apparent that the women did not perceive a prospective bright future with the sisal trade. First of all, very few of them identified sale of sisal produce as profitable considering the lack of market potential. Secondly, even fewer perceived that the prices for their work were satisfactory considering the time and effort put into craft production. However, the majority felt that if they had the market and more skills their lives would be greatly improved and thus the need for training. It seemed necessary for the women to learn skills in spinning and weaving in order to increase their market potential and improve their livelihoods.

The women's limited skills were not their only disadvantage; most of them were uneducated with no history of training. The level of education from the two areas was almost the same, mostly lower primary education hence a relatively high degree of illiteracy. This may have consequences when it comes to marketing, hence the need for a middleman, should an opportunity to trade with a foreign investor arise. When it came to middlemen the women reported that they always ended up being exploited. It is important to try and address the problem of illiteracy and dependency by empowering these women with skills and training in marketing. Although there are many craftspeople operating individually, they are not well organized. It would be relatively easy to find markets for their products if they were organized into cooperative societies as affirmed by Vilakati (1997).

Conservation of resources: Environmental conservation by any friendly means possible is of top priority in this era of potentially irreversible climate change (Masarirambi *et al.*, 2010). Raw materials are sourced locally and craftspeople, who are usually impoverished rural residents, consider these materials as theirs, free for taking. They are unaware that conservation laws regulate the use of indigenous Swazi flora, much as game control laws restrict hunting of native species and provide stiff sentences for poachers (Hall, 2012). The women believed that the sisal plant was very persistent and with controlled fires, threats of species being wiped out were rather low; however, they did agree that cultivating the plants would ensure prolonged sustainability. None of the women had ever been formally educated about conservation and sustainability. Conservation was the least of their concern and this was evident from their non-seasonal harvesting of the sisal plants. Apparently, they would get dyes from any potential plant, young or old trees and knew little about endangered species. There was a great need to educate these women about conservation and sustainable use of natural resources. Key drivers of growth and renewed interest in the field of natural fibres are attributed to new environmental awareness and regulations (Anandjiwala, 2006).

In Swaziland, the legal framework constitutes several Acts that are relevant on paper but difficult to enforce in practice. The National Trust Commission Act of 1972, drafted by the Swaziland National Trust Commission (SNTC) and the Environment Authority Act of 1992, promotes the conservation of indigenous fauna and flora and further protects the national ecology and environment of natural parks and reserves. Most of the plants used for dyeing were not threatened species, even though the women had no ideas when it came to legal issues of conservation. Measures to generate income sustainably and create high quality natural products using traditional indigenous knowledge should be taken.

Small and medium enterprises still remain the area to be promoted in a developing country such as Swaziland even though efforts to improve them have intensified. The European Union is currently trying to help people come together to increase productivity and improve the quality of their products to meet the

requirements of the potential European Union market (Vilakati, 1997). The presence of Tintsaba group of master-weavers in the Hhohho region played a big role as it employed or supported a majority of women. There was also Gone Rural and Swazi Indigenous Products (SIP) in the Manzini region, which are organizations that strive to empower rural women in the fight against poverty, to generate income sustainably and create high quality natural products using traditional indigenous knowledge.

However, the Shiselweni region did not have access to these organizations as it is less commercialized; therefore, the women struggled for market availability. The only organization that reached these women was the Swaziland Trading House whose aim was to centralize the diversity of wood carvers and handicraft makers and give them access to customers worldwide via the internet. It did little to help these women as most were not educated enough to deal with the qualms of internet technology and their affiliation with this venture soon diminished without much success, as it did little to earn them profits. Government must ensure that there is effective coordination, as all partners get involved in the fight against poverty. This would aid the country in achieving its objectives under the United Nations (UN)'s Millennium Development Goals.

The results from Lavumisa were based on near past experiences as none of the women had worked with sisal for the past decade and yet the country has changed considerably since then. However, visits to the main market in Manzini did confirm that the buyers were less interested in un-spun fibre than they used to in the old days and they preferred processed goods. The Nhlanguano group was still trading in sisal, but the group was relatively small to make valid quantitative conclusions, however, since the women were from relatively similar backgrounds, it is fair to say data results would have followed a similar pattern even when numbers were greater.

CONCLUSION

The heart of the handicraft trade lies in product development. The quality, rarity and uniqueness of a product improves its market value hence its profit making potential. There is a great need to train the women in product development, group management and marketing skills. Due to their poverty status, the women from Shiselweni could not afford to enroll in training courses such as The National Handicraft Training Centre at Ezulwini. However, government, development partners, stakeholders, the rich and the poor must all be involved in the eradication of poverty through small scale industries. Poverty is complex and requires intergrated interventions. This can be done by providing market links to international buyers and by

enabling the artisans to benefit from the economic value of their products.

REFERENCES

- Anandjiwala, R.D., 2006. The Role of Research and Development in the Global Competitiveness of Natural Fibre Products. Paper Presented at the Natural Fibres Vision: 2020. New Delhi, India, December 8th-9th.
- Anyaegbunam, C., P. Mefalopulos and T. Moetsabi, 2004. Participatory Rural Communication Appraisal: A Handbook of Rural Development Practitioners. 2nd Edn., Food & Agriculture Organization (FAO), Rome, Italy, pp: 160.
- Boguslavsky, A., F. Barkhuysen, E. Timme and R.N. Matsane, 2007. Establishing of agave americana industry in South Africa. Proceeding of the 5th International Conference on New Crops. Southampton, September.
- Compton, R.H., 1976. The flora of Swaziland, J. S. Afr. Bot. Supplementary, Vol. 11.
- Dlamini, B. and D.K. Rycroft, 1981. Swaziland Flora: Their Local Names and Uses. Ministry of Agriculture and Cooperatives, Mbabane, Swaziland.
- Dlamini, C.S., 2010. Provenance and family variation in germination and early seedling growth in *Sclerocarya birrea* sub-species *caffra*. J. Hort. Forest., 2(9): 229-235.
- GOS, 2010. The Space-based Global Observing System in 2010. WMO Space Programme SP-7, WMO/TD-No. 1513. Retrieved from: https://www.wmo.int/pages/prog/sat/documents/SAT-PUB_SP-7-TD-1513-Space-based-GOS-2010.pdf.
- Hall, J., 2012. Environment-Swaziland: Indigenous Trees Facing Extinction. Retrieved from: <http://ipsnews.net/copyright.shtml>.
- Khoza, L.S. and D.J. Ngubane, 1996. Suitability of indigenous flora extracts for dyeing handicrafts in Swaziland. Uniswa J. Agric., 5: 116-112.
- Lock, G.W., 1969. Sisal: Thirty Year's Sisal Research in Tanzania. Longmans, London, UK.
- Loffler, L. and P. Loffler, 2005. Swaziland tree atlas-including selected shrubs and climbers. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria.
- Marek, J., V. Antonov, M. Bjeljova, P. Smirous, H. Fischer and S. Janosik, 2008. Enzymatic bioprocessing-new tool of extensive natural fibresource utilization. Proceeding of the International Conference on Flax and Other Bast Plants. Saskatoon, Canada, July 20th-23rd.
- Masarirambi, M.T., N. Mhazo, A.M. Dlamini and A.M. Mutukumira, 2009. Common indigenous fermented foods and beverages produced in Swaziland: A review. J. Food Sci. Technol., 46(6): 505-508.

- Masarirambi, M.T., A.M. Manyatsi and N. Mhazo, 2010. Distribution and utilization of wetlands in Swaziland. *Res. J. Environ. Earth. Sci.*, 2(3): 146-152.
- Masarirambi, M.T., S.O. Dlamini, A.M. Manyatsi and B.S. Nkosi, 2011. Medicinal plants of Manzini: Indigenous medicinal plants, harvesting, processing and use. *Proceeding of 14th Boleswana Conference Held at Kwaluseni, Swaziland, July 26-28*, pp: 262-272.
- Mciza, T., M. Thwala, T. Matale, S. Sento, M. Raselimo and M. Nkenteke, 2008. *Geography for Southern Africa*. Macmillan Boleswa Publishers (Pty) Ltd., Gaborone, Botswana.
- Mokhtar, M., A.R. Rahmat, A. Hassan and S. Samat, 2007. Characterization and treatments of pineapple leaf fibre thermoplastic composite for construction application. *Research Report, Department of Polymer Engineering, UTM, Malaysia*.
- Needles, L., 1986. *Textile Fibers, Dyes, Finishes and Processes*. Noyes Publications, Santa Clara California, USA.
- Ngubane, D.J. and L.S. Khoza, 1996. The use of dyes from indigenous flora in Swaziland: The case of Vusweni and Herefords in Northern Hhohho. *Uniswa Res. J. Agric. Sci. Tech.*, (1): 49-52.
- Oseni, T.O. and M.T. Masarirambi, 2011. Effects of climate change on maize (*Zea mays*) production and food security in Swaziland. *Am. Eurasian J. Agric. Environ. Sci.*, 11(3): 385-391.
- Pandey, B.P., 2010. *A Textbook of Botany-Angiosperms*. S. Chand and Company Ltd., New Delhi, India.
- Reddy, N. and Y. Yang, 2005. Biofibers from agricultural byproducts for industrial applications. *Trends Biotechnol.*, 23(1): 22-27.
- Thompson, C.F., 1999. *Swazil and Business Year Book*. Christina Forsyth Thompson, Mbabane, Swaziland.
- Thompson, C.F., 2009. *Swazil and Business Year Book*. Christina Forsyth Thompson, Mbabane, Swaziland.
- Townsend, R., 1999. *Agricultural Incentives in Sub-Saharan Africa: Policy Challenges*. World Bank Technical Papers No. 444. Washington, DC, USA.
- Vilakati, S.S., 1997. *Geography of Swaziland*. Macmillan Boleswa Publishers (Pty) Ltd., Manzini, Swaziland.
- Vilakati, S.S., 2005. *Junior Secondary Geography*. Macmillan Boleswa Publishers (Pty) Ltd., Manzini, Swaziland.
- Wanyana, P.A.G., B.T. Kiremire, P. Ogwok and J.S. Murumu, 2011. Indigenous plants in Uganda as potential sources of textile dyes. *Afr. J. Plant Sci.*, 5(1): 28-39.
- Zwane, P.E. and M.T. Masarirambi, 2009. Kenaf (*Hibiscus cannabinus* L.) and allied fibres for sustainable development in Swaziland. *J. Agric. Soc. Sci.*, 5: 35-39.
- Zwane, P.E., M.T. Masarirambi, N. Magagula, A.M. Dlamini and E. Bhebhe, 2011a. Exploitation of *Agave americana* for food security in Swaziland. *Am. J. Food Nutr.*, 1(2): 82-88.
- Zwane, P.E., M.T. Masarirambi, T. Seyoum and B.S. Nkosi, 2011b. Natural fibre plant resources of economic value found in wetlands of Swaziland: A review. *Afr. J. Agric. Res.*, 6(4): 774-779.