SOCIO-ECONOMIC IMPORTANCE OF TWO INDIGENOUS FRUIT TREES: *STRYCHNOS COCCULOIDES* AND *SCHINZIOPHYTON RAUTANENII* TO THE PEOPLE OF RUNDU RURAL WEST CONSTITUENCY IN NAMIBIA

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ABSTRACT

The purpose of this research was to assess the socio-economic importance of two indigenous fruit trees: *Strychnos cocculoides* and *Schinziophyton rautanenii* in Mile 20 village, Rundu rural West constituency, Kavango region, Namibia. Specifically, the study assesses the contributions of indigenous fruits to household's cash income and the reduction to food insecurity. *The study used an emergent, exploratory, inductive qualitative approach* where semi- structured interview, observation and self-designed household survey questionnaire were used for primary data collection. The researchers also conducted documents review and also collected qualitative information from forestry experts in the Kavango region to complement the other methods. To get the targeted sample from the three hundred household population, the village was stratified into four zones of North, South, East and West. Simple random sampling was used to select thirty-one households from all the zones. The result of the study indicate that the majority of the rural households in Mile 20, Rundu rural West constituency, benefits from the consumption and the sale of Indigenous fruit trees (IFs). More than one benefit is obtained from the sale of indigenous fruits and generating cash income essential for purchasing the required households goods. Some of the important benefits indentified included paying school fees for their children and other dependents, purchasing livestock such as goats, sheep, cattle, and pay hospital bills for family members. The results also show that the IF contributes positively to food security especially during the periods of food shortages and poor harvesting years. Households' members have experienced changes in their livelihood and wellbeing as a result of the income generated from the sale of indigenous fruits.

Keywords: Indigenous fruit trees, food security, cash income, rural households, Namibia.

INTRODUCTION

In Sub-Saharan Africa indigenous fruit trees play vital roles in livelihood security for many rural community members, especially during the period of drought and scarcity, (Saka *et al*., 2002, 2004; Akinnifesi *et al*., 2004). These fruit trees also become increasingly important as source of food to supplement diet in better times. Indigenous fruit remain one of the major options for coping with hunger, nutritional deficiency in diets and poverty as a source of food and a means of generating cash income essential for purchasing the required households goods in rural areas (Campbell *et al*., 2002). Namibia is the most arid country south of the Sahara located in Southern Africa with a size of 852,418 km^2 and with a population of about 2 million at a rate of 1.87% from 2005 to 2010 (UN, 2010). Majority (68%) live in the rural areas where most people earn a living from agriculture (Central Bureau of Statistics, 2001). Namibia is not a forest-rich country with most of the country's territory (65%) covered by sparsely wooded savannah and denser woodlands of 20% occurring in the wettest regions in

the north-east of the country (Benkenstein *et al*., 2014). Yet the woodland savannah plays an important ecological and socio-economic role, supplying wood and timber for a variety of uses, as well as non-timber forest products (Benkenstein *et al*., 2014). Namibia's forest resources promise not only ecological benefits but also a direct, beneficial impact on local livelihoods, particularly for the rural poor.

The livelihood of most Namibians depends directly or indirectly on indigenous natural resources, and much land is thus used for agriculture than other purposes. Non Timber Forest Products (NTFPs) play an important role in the local economy of the Namibian people. The direct and indirect contribution of NTFP to the national economy during 2004 was estimated to be N$619 459 000 (U$ 77 432.375) (Mendelsohn and El Obeid, 2005). For these reasons commercial and personal harvest of forest products is increasing every year because the products derived from forest and trees are important sources of cash income and employment for the rural poor. For example, *Strychnos cocculoides* harvested in Kavango have been used to produce a liqueur which is exported to South Africa (Mendelsohn and El Obeid, 2005).
Indigenous fruits constitute an important source of livelihood for the people of Rundu Rural West constituency. The local people in this constituency depend on indigenous fruits in their day-to-day life and also contribute to household income. Indigenous fruits (IF) have currently received considerable interest from various stakeholders, due to their economic and nutritional values (Chakanga, 2003). Among the strategies used by the rural people to overcome food shortages, is the use of wild fruits from indigenous fruits trees. *Strychnos cocculoides* and *Schinziophyton rautanenii* are the most popular fruit species in Kavango Region. Because of their abundance, fruit value, transformation and socio-economic value, the two fruit trees species are most preferred in the Region. In Namibia, plant foods are amongst the most important non-timber forest products. More plant food is available in northern and north-eastern Namibia, mainly because this is where most species that bear fruit occur. Of all the tree species in Namibia, 157 species (35%) have been recorded as being used for food in one form or another (Mendelsohn and El Obeid, 2005). The potential of community forests to generate revenue differs according to the geographic and social dynamics of specific sites (Benkenstein *et al.*, 2014). Government programs have always focused more on timber production and have overlooked commercial production of indigenous fruits. The socio-economical contribution of individual indigenous fruit trees has not been looked at properly although it is well-known that indigenous fruits play a significant role in many rural people's livelihoods.

The role of indigenous fruit is particularly important in the Southern Africa Development Community (Maghembe *et al*., 1998; Cunningham, 2002; Tiisekwa *et al*., 2004), especially for the marginalized group in society. Despite many studies carried out on socio-economic contribution of non-timber forest products (NTFPs) to livelihood and on others aspects such as tourism, there has not been many studies conducted on socio-economic impact of indigenous fruit trees in rural areas. Hailwa (1998) conducted a study on the general importance of Non Wood Forest Products (NWFPs) in Namibia and revealed that *Schinziophyton rautanenii* is an important source of food to many rural communities especially in the San community who do not practice agricultural activities. Furthermore the study also revealed that *Strychnos cocculoides* fruits are sold on the road side in rural areas at about N$0.50 to N$1.00 (U$0.06 to U$0.13) per fruit. Just like in Namibia, Cameroon's economy is heavily dependent on natural resources. Ekane (2006) studied the socio - economic impacts on forest products and revealed that forest resources are a major source of livelihood for forest dwellers or people living in most rural areas. A study carried out by Dagmar (2004) emphasised on the importance on the contribution of indigenous fruit trees

towards rural income and reduction of poverty. The study proved that majority of rural household benefits from consumption and sale of indigenous fruits. Also within the households, children are the main consumers of the fruits while marketing of the fruits is carried out by women who use the receipts to purchase households goods. According to Ramadhani (2002), there is a substantial amount of trading and consumption of *Uapaca kirkiana* and *Strychnos cocculoides* indigenous fruits in both rural and urban areas of Zimbabwe and these fruits reduce poverty by 30% and generate income above the poverty line throughout the year.

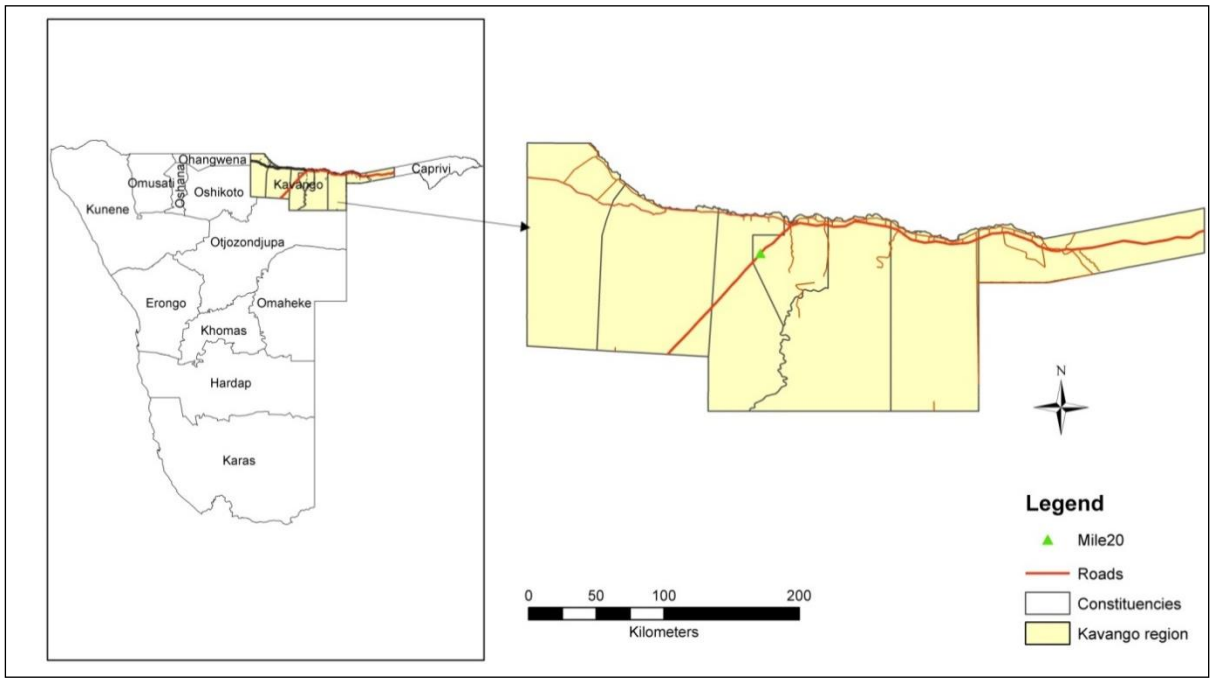
From the literatures cited so far it is clear that at least in some African countries indigenous fruits have the potential to contribute largely to poverty reduction through marketing that contribute to households cash income. In Kavango region indigenous fruit trees are valuable on biodiversity terms and as an economic resource. It is well-known that indigenous fruits play a significant role in many people livelihoods. However, there is little information on socio-economic impact on indigenous fruits and their role within the households system in comparison to income alternatives in the Kavango region. Poor people in the region live in marginal lands, far from economic growth points, such that during off-cropping season they have no other sources of income generating activities rather than harvesting and selling indigenous fruits. Indigenous fruits were said to be very important to Rundu rural west community especially during years of drought, when the harvest of people's staple food is low, they rely on indigenous fruits for their survival. The socio-economic benefits of community forests lie primarily in their ability to enhance rural livelihoods by providing fuel wood, building materials, grazing, medicinal plants and other resources, rather than generating sufficient revenues for significant poverty alleviation (Benkenstein *et al*., 2014). There is therefore a need to assess the socio-economic impact of indigenous fruits in order to help the Government to improve the status of local people. It is against this background that this study was conducted to assess the socio-economic contributions of *Strychnos cocculoides* and *Schinziophyton rautanenii* indigenous fruits to households' cash income and the reduction to food insecurity.

METHODOLOGY

Description of the study area

The study was conducted in Rundu Rural West constituency in Kavango region, North East of Namibia. Kavango region is one of the thirteen political regions in Namibia and lies between 18.00^{o}E and 22.00^{o}E and 17.09^{o} and 18.01^{o}S. The population is estimated to be 26 622 while that of the whole region is estimated at 202 691 (Central Bureau of Statistic, 2001). The study specifically focused on Mile 20 Village within the constituency. Mile 20 is located approximately 32 km south of Rundu, along the Rundu-Grootfontein main road. Kavango region has an average annual rainfall of 550 mm, which increases slightly from southwest to northeast. Animal husbandry and Horticulture is playing an increasing role in the economic lives of the Kavango people (Mendelsohn and El Obeid, 2005). Another important economic activity is fishing, which provides a substantial source of protein to the people. The most important crops are pearl millet (*Pennisetum glaucum)*, sorghum and maize. Ground nuts, beans, pumpkins, and tobacco are cultivated on a small scale (Mendelson and El Obeid, 2005). The site was selected based on the highly abundant and marketing potential of *Strychnos cocculoides* and *Schinziophyton rautanenii.* Most of the local people in the study area are engaged in indigenous fruits collection and marketing. Furthermore the area is easily accessible and the community had been visited in 2003 by the fruit tree improvement

specialist program in the Directorate of Forestry (DoF) in collaboration with Food Agriculture Organization (FAO).



Map of Namibia showing the study area (NRSC, 2009)

Research design

The study used an emergent, exploratory, inductive qualitative approach. The reason for choosing this approach was that qualitative research excels at generating variables that are very detailed, has special value for investigating complex and sensitive issues and is good when one really want to achieve a deep understanding of the issue under study (Day, 2003).

Data collection

To collect as much and as diverse data as possible that can help generate the best possible insights about the phenomenon of interest, semi- structured interview, observation and self-designed household survey questionnaire were used for primary data collection. The researchers also conducted documents review and also collected qualitative information from forestry experts in the Kavango region to complement the other methods. The purpose of documentary analysis was to enrich the literature and also to support the study's findings derived from the participants' responses. The questionnaire sought to capture quantitative data on the use of indigenous fruit trees as well as their role within the household system in the study area. The questionnaire consisted mainly of close-ended questions which required the respondents to tick their best option. To get the targeted sample from the three hundred household population, the village was stratified into four zones of North, South, East and West. Simple random sampling was used to select thirty-one households from all the zones. The questionnaire was administered to all the residents in the household after which focus group discussions were used to gain insight into participant's view on the subject under consideration. Household heads were purposefully interviewed. In addition, physical observation was also done in order to have a clue on the socio-economic impact of indigenous fruit trees in the study area. All the households sampled were involved in indigenous fruits collection and sales. Research assistants from Hamoye Forestry Office and

the authors collected the needed data. The data obtained from all the sources were evaluated using, content analysis, descriptive statistics and graphs.

RESULTS

Demographic description

From the analysis, it was observed that the respondents who represented the households, 74% were females and 26% were males. In terms of age, 14 were 18-30 years, 10 were in the age group of 30-50 years while 7 were between 50-80 years. Occupation wise, the respondents were mainly farmers and their dependents were mostly children, husband and housewives. The survey also indicated that 21 respondents have 1-10 dependents in their family, while 8 had 10-20 family members. The highest family size was 20-30 which was reported by 2 respondents.

Indigenous Fruits (*Strychnos Cocculoides* and *Schinziophyton Rautanenii*) Contribution to Households' Cash Income and the Reduction of Food Insecurity

In assessing the contributions of indigenous fruits to household's cash income and the reduction to food insecurity, data and all relevant information which are the result of the above objective have been analysed quantitatively to bring out the extent of socio-economic changes in the livelihood and direct benefits of Rundu Rural West constituency. In particular the study looked at source of cash income contribution, benefits obtained from the sale of the fruits and reduction to food insecurity.

Source of income

Figure 1 indicate that the major source of income is from sales of indigenous fruits (51.6%) while 12.9% from formal employment, 9.6% both from Pension, wages and Salaries, Farming 6.5% while 6.4% from Casual employment.

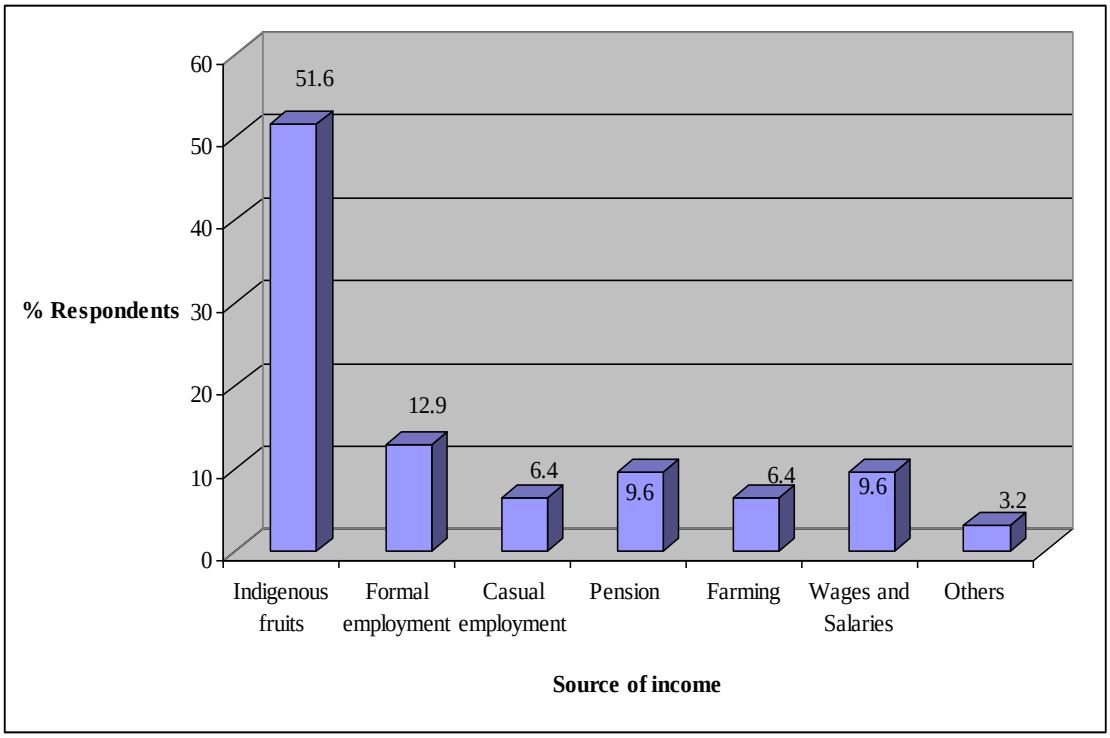


Figure 1: Distribution of household's source of cash income

Fruits are sold in 50kg bags. A total of 17 respondents sold less than 40 bags of fruits, 5 sold 40-80 bags, 8 sold 80-300 bags, and 1 respondent is reported not selling *Strychnos cocculoides* fruits. Furthermore, *Schinziophyton rautanenii* are also sold in 50kg bags. About 10 respondents sold less than 40 bags of fruits, 3 sold 40-80 bags, and 3 sold 80-300 bags, while 15 reported not to be selling *Schinziophyton rautanenii*. The price data collected was broken down into ranges of price of indigenous fruits as shown in Figure 2. It is revealed that most of the households (22.5%) sell their *Schinziophyton rautanenii* for price ranging from N$10.00 to N$15.00 per 50kg bag, while 12.9% sell at a price between N$15.00 to N$20.00. The highest price per bag was N$25.00 to N$30.00 which was sold by 6.4% of the respondents. However, 48.3% respondents do not sell *Schinziophyton rautanenii* fruits. From the ranges, the average price of fruits per 50kg bag was estimated at N$ 20.00.

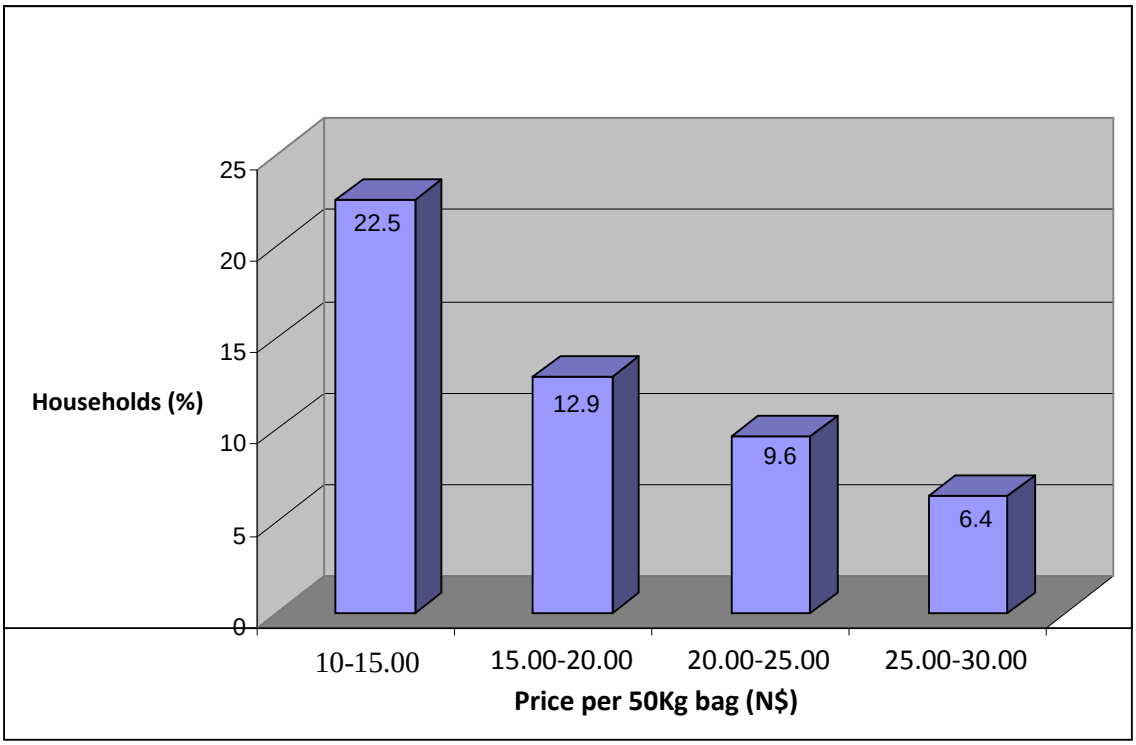


Figure 2: Percentage distributions of price ranges (per 50 Kg bags) of *Schinziophyton rautanenii*

Figure 3 revealed that the majority of respondents (74.1%) sell their *Strychnos cocculoides* fruits for the price ranging from N$0.50 to N$1.00, while 16.1% sell at a price between N$1.00 to N$3.00. The highest price per bag was N$3.00 to N$5.00 which was sold by few (6.4%) households. The prices of *Strychnos cocculoides* depend on the size of the fruits. However, from the ranges, the average price per fruit was estimated at N$2.20.

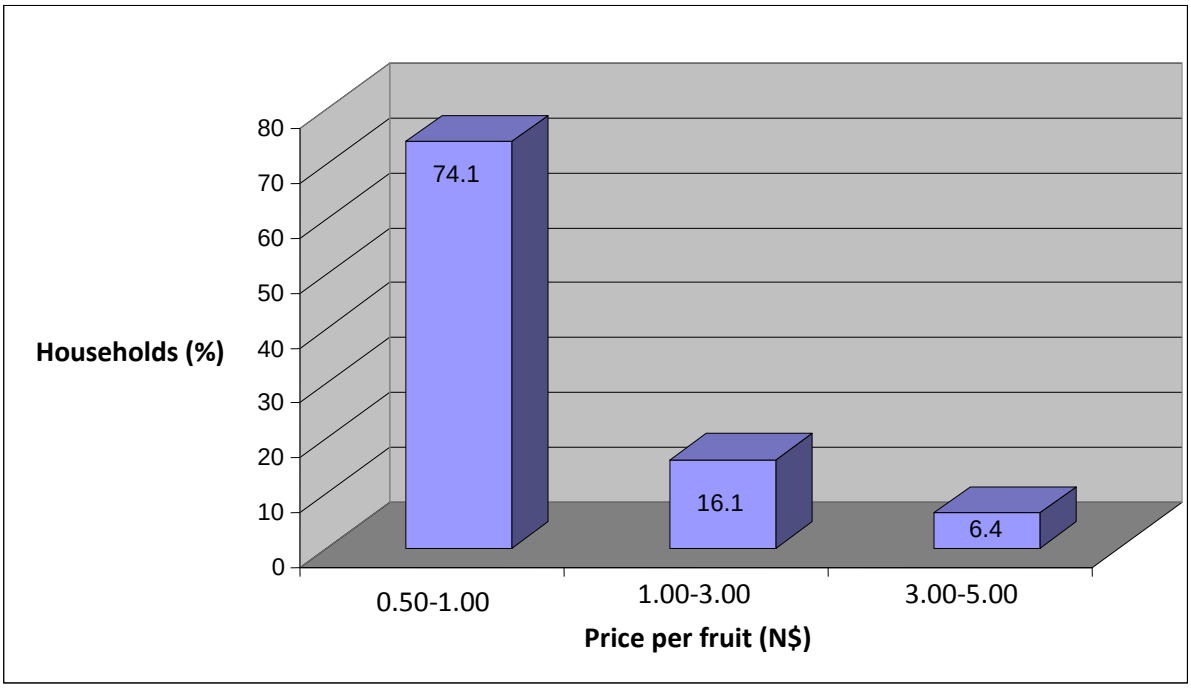


Figure 3: Percentage distribution of price per fruit of *Strychnos cocculoides*

Table 1 and 2 present the relationship between incomes generated per annum to the number of *Strychnos cocculoides* and *Schinziophyton rautanenii* sold. Table 1 revealed that 15 people earned less than N$800 of which they sold less than 40 bags of fruits while 2 respondents earned between N$ 900 to N$ 1200. About 2 respondents earned between N$ 1300 to1600 of which they sold 40 to 80 bags. About 4 respondents earned between N$ 1300 to1600 of which they sold 80 to 300 bags. Other 2 respondents earned 1900 to 2200 for which they sold 80-300 bags of fruits. The highest income generated by 2 respondents, was more than N$2300 of which they sold 80-300 bags of fruits. The average cash income generated per household from *Strychnos cocculoides* is around N$953.33 per annum.

Table 1: Cash income generated per annum in relation to the number of *Strychnos cocculoides* fruits sold

		Income per annum (N$)						**Total**
	Range	< 800	900 – 1200	1300 – 1600	1700 – 1800	1900 – 2200	> 2300	
IF sold	< 40	15	2	0	0	0	0	17
(50 kg	40 - 80	0	3	2	0	0	0	5
bags)	80 - 300	0	0	4	0	2	2	8
	> 300	0	0	0	0	0	0	0
Total		**15**	**5**	**6**	**0**	**2**	**2**	**30**

Table 2 showed that 7 people earned less than N$800 of which they sold less than 40 bags of *Schinziophyton rautanenii* fruits and only 1 sold more than 40 bags. Only 2 people manage to sell over 40 bags and earned between N$ 900 to N$ 1200. Furthermore 3 of the respondents sold a large number of bags of 80 to 300 and accrued between N$ 1300 to N$2200. The average cash income generated from *Schinziophyton rautanenii* is around N$571.25 per annum.

Table 2: Income generated per annum in relation to the number of *Schinziophyton rautanenii* fruits sold

		Income per annum (N$)						Total
	Range	< 800	900 - 1200	1300 - 1600	1700-1800	1900-2200	> 2300	
IF sold	< 40	7	3	0	0	0	0	10
(50kg bags)	40 - 80	1	2	0	0	0	0	3
	80 - 300	0	0	1	1	1	0	3
Total		**8**	**5**	**1**	**1**	**1**	**0**	**16**

Benefits obtained from the sale of the fruits

Qualitative changes in the social and economic status have been observed from opportunities, and benefits of the households obtain from selling of fruits. Table 3 shows benefits obtained from monetary value accrued from indigenous fruit's sales. Benefits associated with indigenous fruits' revenue were included in the questionnaire in order to discover how indigenous fruits might be best in providing respondents perceived benefits. The possible benefit indicated includes meeting basic needs (e.g. food, clothes and groceries), paying school fees and buying luxuries. The majority of the people (61.3%) accounts for more than one benefit such as purchase of donkey cart for transporting fruits from the field, purchasing of goats, cattle and house maintenances and needs. Few (3.2%) reported to accrued luxury benefit from indigenous fruit's sales.

Table 3: Percentage of benefits attributes of indigenous fruit's sales

Benefits	**Household's Respondents %**
Basic needs e.g. food, clothes and groceries	19.4
School fee	16.1
Luxury	3.2
More than one benefits e.g. purchasing of livestock, donkey cart, transport money, house maintenance and needs	61.3
Valid %	**100%**

Majority (96.8%) of the household respondents reported that the indigenous fruit's contribute to food security, while 3.2% of the respondents felt that the fruit's does not contribute to food security.

DISCUSSION

Indigenous Fruits (*Strychnos Cocculoides* and *Schinziophyton Rautanenii*) Contribution to Household's Cash Income and the Reduction of Food Insecurity

Indigenous fruits trees play a vital role in livelihood for many rural community members. *Strychnos cocculoides* and *Schinziophyton rautanenii* fruits are a means of generating cash income for the community of Mile 20 village in the Rundu Rural West constituency. This has been proven by the result of the study which showed that majority of the people depend on indigenous fruits as the major source of income. The respondents pointed out that the income

generated from the indigenous fruits is their major source of income because the fruits can be access by everybody in the area. The two fruit trees are found abundantly in Mile 20, Rundu Rural West constituency than in any other areas within the region. Because of the abundance, and marketing value, the two fruit trees species are most preferred in the Region. These results explain the importance of indigenous fruits to rural households.

The price of the *Strychnos cocculoides* fruits is determined based on the size. The price is ranging from a minimum price of N$0.50 to a maximum price of N$5.00. The price for *Schinziophyton rautanenii* ranges from N$10.00 minimum to N$30.00 maximum price per 50Kg bag. On average a household collect about 83 bags of *Strychnos cocculoides* and 72 bags of *Schinziophyton rautanenii* fruits per annum. Both fruits are popular but *Strychnos cocculoides* fruits are more valuable mainly in term of cash income while *Schinziophyton rautanenii* fruits are most valuable on both cash income and food. *Schinziophyton rautanenii* fruits supplement food requirements especially during poor harvesting years. The average cash income generated per household from *Strychnos cocculoides* is around N$953.33 per annum. In contrast, the average cash income generated from *Schinziophyton rautanenii* is around N$571.25 per annum. The results imply that both species contribute positively to household cash income; however more cash income is generated from the sale of *Strychnos cocculoides*. This might be because most households collect more fruits of *Strychnos cocculoides* than *Schinziophyton rautanenii*. Furthermore the majority of the respondents stated that, apart from selling the fruits at the main road and Rundu open market, they also sell *Strychnos cocculoides* fruits in urban areas and other places where they are not available in the country. When the fruits are sold in urban areas, the price will be higher than when sold within the region. This is also one of the reasons why more income is generated from the sale of *Strychnos cocculoides*. The low price in the study area is attributed to high competition. The fruits of *Schinziophyton rautanenii* are mainly sold in the homestead and local markets and the fruits are mostly preferred by rural people within the region. About 26.7% generate an income ranging from N$ 1200 to N$2200. Few of the respondents earned an income of more than N$2300. From the results it is clear that households that sold many bags of fruits generated considerable higher income. The result indicate that indigenous fruit tree products are source of food and also a means of generating cash income essential for purchasing the required households goods in rural areas. The results are in line with those of Dagmar (2004) who reveals that the majority of rural household benefits from consumption and sale of indigenous fruits.

Most of the households in Mile 20 village generate cash income from indigenous fruits for household needs. The study results showed majority of the households obtain more than one benefit from the sale of indigenous fruits and generating cash income essential for purchasing the required households goods. These benefits include school fees for their children and other dependents, livestock such as goats, sheep, cattle, and pay hospital bills for family members. One respondent reported that he is living a luxury life after selling indigenous fruits, for instance he managed to buy a Digital Satellite Television (DSTV) and donkey cart for his household. This indicates the importance of the contribution of indigenous fruit trees towards rural households' cash income. The result also proves that cash income generated from indigenous fruits is the major source of income of many households in Mile 20 village. This is also the reason why most of the households are involved in the sale of indigenous fruits.

Rural households frequently rely on indigenous fruits and other wild food resources to supplement their source of food from agricultural production. In Rundu Rural West constituency, indigenous fruits are used as part of the natural food resources that can

supplement food supply during the periods of food shortages and poor harvesting years. The utilisation of indigenous fruits as food sources help to sustain food security in this area. The statement above can be justified by the study findings that show that majority (96.8%) of the households investigated were of the view that indigenous fruits contribute significantly to food security**.** The household respondents pointed out that during the period of food shortage, one can survive on indigenous fruits especially on *Schinziophyton rautanenii* fruits. The *Schinziophyton rautanenii* fruits/nuts serve multiple purposes and are the most valuable parts of the fruits. The nuts of *Schinziophyton rautanenii* can be crushed and added to meat or vegetable to make a tasty soup**.** The pulp can make porridge and nuts can also make a soup that can be eaten with porridge. Some of the respondents pointed out that the nuts of *Schinziophyton rautanenii* fruits yield a high quality of yellow oil which is used for food and cosmetics. Further more fruits can also be stored for a longer period. The fruits of both species are edible and can be made into high or hot alcoholic liquor made from the fermented fruits locally known as "kashipembe". In addition the fruits can be exchange with pearl millet (*Pennisetum glaucum).* Some community members have also been trained by the forestry officials on how to make jam from *Strychnos cocculoides* fruits. Differences exist between the two species in terms of value; *Strychnos cocculoides* fruits are more valued for its commercialisation potential whereas *Schinziophyton rautanenii* is valued as a food source

Our study confirms Hailwa (1998), who revealed that *Schinziophyton rautanenii* is an important source of food to many rural communities in North Eastern Namibia. *Schinziophyton rautanenii* supplement food requirements during the poor harvesting year also confirms Ramadhani (2002), who noted that home consumption and marketing of indigenous fruits contribute substantially to household's livelihoods, cash income and enables households to live above poverty line during the critical famine periods**.**

CONLUSION

The study assessed the socio economic importance of two indigenous fruits in Mile 20 village in Rundu Rural West Constituency - Kavango region. The study has compared two species: *Strychnos cocculoides* and *Schinziophyton rautanenii* and assess which species contribute more to the households' cash income and to reduction of food insecurity as well as benefits derived from the sales. The study has shown that *Strychnos cocculoides* and *Schinziophyton rautanenii* indigenous fruits are important source of livelihood and a means of generating cash income for people living in the constituency. The study revealed that *Strychnos cocculoides* contribute to households' cash income only. In contrast *Schinziophyton rautanenii* contribute both to cash income and to food, therefore this fruit tree species contribute to the reduction of food insecurity in the area. *Schinziophyton rautanenii* supplement food supply during the periods of food shortages and poor harvesting years. The result indicates that *Strychnos cocculoides* is mainly valued for its contribution to households' cash income whereas *Schinziophyton rautanenii* is valued as a food source. The cash income generated from the sale of the indigenous fruits is essential for purchasing the required households goods. Majority of the households felt that the cash income generated from the sale of indigenous fruits are sufficient enough to sustain household family members while some minority also felt that income generated is not sufficient enough and the sale of the fruits seems not to have any positive socio-economic impacts on their livelihood. However the entire sample population has experienced a positive changed in their livelihood and life style since the sale of the indigenous fruits.

ACKNOWLEDGEMENT

The authors would like to thank the Namibia Ministry of Agriculture, Water and Forestry for funding this study. We are also grateful to the Directorate of Forestry for granting us the opportunity to undertake this study. We extend our appreciation to the people in the study area particularly the people of Mile 20 village, Rundu rural West constituency, Kavango region who took great interest in the study, shared their knowledge and patiently answered many questions.

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