Journal of Resources Development and Management
ISSN 2422-8397 An International Peer-reviewed Journal
Vol.25, 2016

Investigation of Moringa Production and Marketing Potential in Eastern Part of Ethiopia (A Case Study of Dire Dawa City and Rural Administration Zone)

Mulugeta Girma[1] Atinafu Kebede[2] Mingizem Birhan[1]
1.lecturers, department of marketing management, Dire Dawa university ,Dire Dawa, Ethiopia
2.lecturer department of biology, dire Dawa university dire Dawa Ethiopia

Abstract
The main purpose of the study was to Investigate Moringa production and Marketing potential in Eastern Part of Ethiopia especially in Dire Dawa City and Rural Administration Zone. A mixed approach with 274 and 368 usable samples were used and collect a data from Dire Dawa city dwellers and farmers randomly and relevant data were gathered, presented and analyzed using descriptive and inferential statistical techniques. The findings revealed that there is a demand for the processed moringa products and have awareness to the benefit of the plant in both rural and urban kebeles residents though there is less interest to produce the plant for commercial purpose by farmers.
Keywords: Marketing; Moringa; Production Awareness; Perception; Interest and zone

1.Introduction

Moringa is a multipurpose and exceptionally nutritious vegetable tree with a variety of potential uses throughout the world (Nadeau and Zakaria, 2012; Vlahof et al., 2002). Different studies show that, it has very high nutritional properties that would be useful as a food supplement, especially in those relegated communities in addition to , it's nutritional and medicinal applications for both human and animals and in various industrial applications (J.P., etal... pp 253-54 , 2010; Mishra,S. et.al 2011 ; Patel,J.P., Bharat, G and Patel, K. 2010).

Studies have equally shown that it can provides excellent economic opportunities for agricultural producers, traders and processors thereby making it effective in tackling micronutrient insecurity while equally holding the promise of sustainable economic returns to the farmers (Nadeau and Zakaria, 2012). The tree crop of which leave, seed, bark, pods are of economic importance could be grown as a relatively cheap, all year round, high quality food for both humans and animals (Foidl, et. al., 2001). On this regard, the plant being the most widely cultivated species in Ethiopia and around the world (Bosch, C.H., 2004) and used as a nutritional and medical plant And the demand for the product are growing in the main cities of the country specially in Addis Ababa where the price per-kilo reach from 60 birr to 400 for imported Moringa powder though there is no such market demand studies are done still now and The demand are largely grown and provided indifferent form in Dire Dawa.

1.2. Statement of the Problem

With striking population change like Ethiopia supplemented with recurrent drought and shortage of rainfall, adopting of different nutritional plants become vital specially plants which can resist climate changes and grow with unsuitable and harsh environment i.e. moringa that can be used as foods and supplementary food (Foidl, et. al., 2001and Premi et al. 2010), and become a well-documented nutritional and medicinal properties that can provides excellent economic opportunities for agricultural producers, traders and processors thereby making it effective in tackling micronutrient insecurity while equally holding the promise of sustainable economic returns to the farmers (Nadeau and Zakaria, 2012). Study show that In an attempt to reduce hunger and improve nutrition and water supplies in order improve health conditions poor-peoples in developing countries use M. oleifera and other species as a source of food and coagulant aid. (Jahn, 1988 ; Evans, 1991; Olayemi and Alabi; Mayer and Stelz, 1993; Folkard and Sutherland, 1996; Panga, 2002) and further the plant is a remedy for the cure of various ailments such as diabetes, asthma, bronchitis, tuberculosis, dysentery (Ramachandran et al. 1980). in the meantime in Ethiopia i.e. Konso, Negelle ,Welita Sodo ,Somalia etc… it used as treatments for epilepsy , diarrhea, cure for malaria, stomach problems ,diabetes , water treatment, hypertension, retained placenta, asthma, colds, to induce vomiting and to promote wound healing (www.eziga.com). Showing the need for looking such type of plant is vital for the country in order to maximize the benefit for all users and producers (Abuye, C.etal, 2003). Though no deep investigation has been done on its production, marketing as well value chain potential and activities which can create job opportunity and sources of entrepreneurship (Abuye, C.etal,2003). but According to preliminary analysis done by the researchers the price of Moringa powder in Dire Dawa for a kilo is 180 birr depending on the quality of the packaging and processing and currently the small amount produced in the city is commercialized informally which is also common in other countries too as shown by Orwa et al, 2009 and currently in Dire Dawa there is a bottlenecks in the value chain and awareness creation for both consumer

and potential producers in terms of it different vitalities. On this regard, the study explores the potential of Moringa production and marketing in eastern part of the country especially in Dire Dawa and furthermore has an objective of;

- ☆ Exploring farmers understanding Moringa benefit as plant and as a product
- ☆ Exploring consumers awareness Moringa's benefit
- ☆ Describing the potential of Dire Dawa soil and climatic zone, for the production of Moringa in comparison to other area.
- ☆ Identifying means of building awareness of the farmers and community on cultivation and harvesting and usage
- ☆ Exploring how it can be opportunity and sources of entrepreneurship to increase Socioeconomic Values
- ☆ identifying major constraint that become obstacle for marketing of marina plant

2.0. Literature Review

2.1. Introduction to Moringa

Moringa stenopetala belongs to family Moringa cease that is represented only by a single genus Moringa. The genus is represented by 14 species to which Moringa stenopetala belongs. Northeast tropical Africa is a center of endemism plus diversity to the genus (Mark, 1998 and Edwards et al., 2000). And the species is known by different vernacular names in different country (Mark, 1998).

2.2. Benefit of Moringa Plants

Moringa stenopetala is often referred to as the African Moringa Tree because it is native only to Ethiopia and northern Kenya (Mark, 1998). It is reported that the edible parts are exceptionally nutritious (Rams, 1998). The leaves are one of the best vegetable foods that can be found in the locality and all parts of the tree except the wood are edible, providing a highly nutritious food for both humans and animals, are rich sources of calcium and iron, and good sources of vitamins A, B, and C (when raw) and of protein including goodly amounts of the sulfur- containing amino acids, methionine and cystine (Rams, 1998 ; Fuglie, L.J.1999; Kadashi Y.D. 2008 and Babu, S.C. ,2000), dry season fodder, mulch and fuel wood supply the flowers are a good nectar source for honey and can be eaten or used to make a tea,(S. Lalas et.al, 2003 ; Fuglie, L.J. 2000; Jahn, 1984; D'Souza and Kulkarmi, 1993; Folkard and Sutherland, 1996; Makkar and Becker, 1997; Fuglie, 2001; Singh,S.,et.al .2012 and Panga, 2002) and the seed are rich oil sources for cooking and lubricant uses (Sutherland, 1996; Tsaknis et al., 1998 and Jahn, 1984). Even very muddy water can be cleared then crushed seeds are added (Gupta and Chaudhuri, 1992). Also other studies show by Ozumba (2008) outlined several medicinal uses of Moringa oleifera indicating that up to 81 remedies are produced from several parts of the tree .i.e. 22 remedies are produced from the leaves, 8 from the flowers, 3 from the pods, 14 from the roots, 17 from the root bark and stem bark, 9 from the gum, 4 from the seed and 4 from the seed oil and being incorporated into an ointment to treat common bacterial infections of the skin(Quisumbing, 1978; Morton, 1991; Limaye et al., 1995; Ezeamuzie et al., 1996; Palada, 1996 Fuglie, 2001 Kadashi Y.D. 2008 and Ramunze.,2003). further study proves that it used as treatment and protection of tumor (Olson and Carlquist, 2001) Diabetes (Luchington, *et al.,* 2005;Ramachandran C, et.al.,1980; Ramalingam, 2010 and Ludington, 2005; Omoruyi and Adamson, 1994 and Judith, *et al.,* (2005).It is used in Siddha medicines, as sexual virility drug for treating erectile dysfunction in men and in women, for prolong sexual activity ;HIV/AIDS Management (Villarreal and Anyonge, 2006 and Buger and Herzing 2002)used as immune stimulant for HIV positive people, particularly for those who cannot afford good nutrition and medicine in Africa (Villarreal and Anyaonge, 2006). used for Livestock and Water Management (Okeke , 2010).

Cultivation and Harvesting: Moringa stenopetala grows wild in elevations between 1,000 and 1,800 m (Mark, 1994) but it will grow as high as 2200m and as low as 300m in Ethiopia and It is an extremely fast-growing tree and continued to grow during the exceptionally long dry season (Ethiopian tree foundation fund, 2004). Moringa grows best in well-drained soils with pH of between 5.0 and 9.0 and in temperatures between 25 and 48°c. and -1to 3°c(Nautiyal and Venkataram, 1987; Coote et al., 1997). It can survive drought as well as frost (Crosby, 2007; Palada & Change, 2003). It prefers alluvial sandy soils though it will grow in a variety of soils apart from stiff clays (Coote et al., 1997) the tree grows even in marginal soils and with very little care (Morton, 1991; Folkard and Sutherland, 1996).

2.3. Constraints for production and marketing of Moringa plant

Although the markets for the alternative products are very different there is one constraint to development that is common to them all and that is that they are all considered to be 'new' products which influences the awareness perception and interest of to purchase the plant further Financial , Research and development awareness, perception and interest ,Regulatory approval are also significantly affect production and marketing of moringa. In addition to perishabilty of the plant; Price /Quantity Risks; Seasonality; Product bulkiness (Sutherland,

J.P.et.al, 2001;Non-necke, 1989 ; FAO, 1986, cited on Abay, 2007). further lack of market access, market information, and many biological factors (Weinberger and Lumpkin, 2005) lack of awareness on product packaging, handling, transport labeling and processing equipment(Bezabih and Hadera.,2007).

2.4. Empirical Findings In Ethiopia

In Ethiopia Jema (2008) indicated that limited access to capital markets, high consumer spending, and large family size attributable to lower economic efficiency for the marketed driven production like vegetables; Risk related to persishability and seasonality of supply, illiteracy, and client-buyer's type were found to be the significance factors causing contract breaches by the trader(Jema (2008), Bezabih and Hadera (2007). Million and Belay (2004) indicated that, lack of market outlets, storage and processing problems, lack of marketing information, capital constraints, high transportation cost and price variation are some of the important constraints in vegetable production Moti (2007).

3.Material And Method

3.1. Description of the Study Area

Dire Dawa is located between 9º27N and 9 º49 S longitude and Between49 38 E and 42 19 W latitude with the total land size of 1288 km, of which nearly 97.73% accounts for the land size of the rural areas, while the remaining 2.27% covers the land size of the urban areas of the administration with The total estimated population of 342, 827. And classified as 9 urban and 38 rural Kebele Administration (CSA2014/15)

3.2. Sampling method

The Study implemented mixed research approach to triangulate data and in order to map out the potential of moringa production and marketing in Dire Dawa city and rural zones through identification of awareness ,perceptions and interest to produce and use the plant for different purposes. Meanwhile, in this study the target population were community of rural and city administration and decided to consider only respondents who are over the age 18-years-old. on this regard there are 61763 household as target populations in the rural kebele of Dire Dawa (CSA, 2014/15) $n = \frac{N}{1+N(E^2)}$ (www.cengage.com/highered)

$$398 = \frac{61763}{1+61763\ (.05^2)}$$

A total of 398 copies of printed questionnaire were distributed to each selected rural kebeles proportional to their population number in terms of households at each kebele of rural area who engaged in framing activities focused on semi desert and dry area of rural kebele.

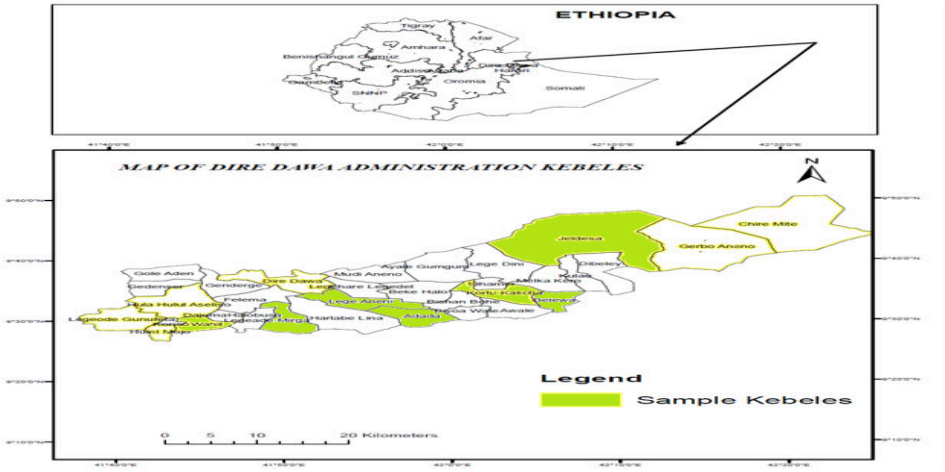

Figure 1 Map of the rural kebeles

For the city administration population, there is estimated population of 130215 excluding age interval of 0-19 years old in all 9 Keble (CSA, 2012/13) and draw a sample referring to Krejcie & Morgan (1970), pp. 607-610) with predicted proportion margin of error of plus or minus 5.0 %, and based on this there were responses from 280 respondents as per the formulas where "n" refers sample size" X^2 " refers chi square for specified confidence level of interval at one degree of freedom, "p", population proportion and " ME", desired margin of error.

$$n = \frac{x^2 \times N \times P(1-P)}{(ME^2 \times (N-1)) + x^2 \times P(1-P))}$$

$$n = \frac{3.84^2 * 130215 * .05(1-.05)}{.05^2 * (130215-1) + (3.84^2 * .05^2 * (1-.05)} = \frac{91204.66944}{325.571875} = 280$$

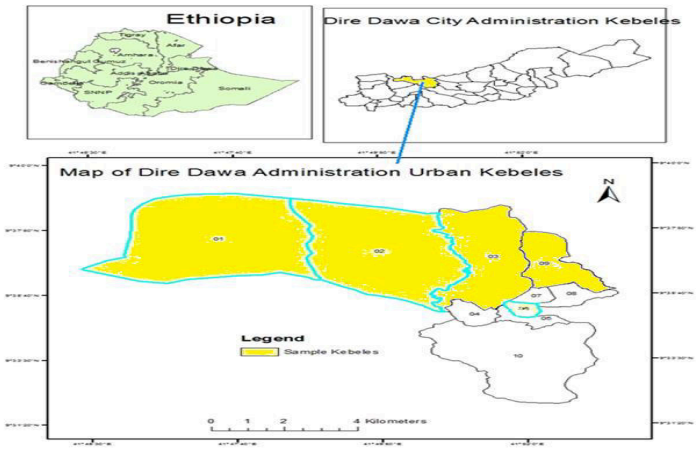

Figure 2 map of the selected urban kebeles

3.3. Data collection and analysis

a linkert scale questionnaire were developed and Data collection took place between May to June, 2016. Intercept survey approaches were used to collect data from consumers and farmers at geographical area personally by the researchers as well as helps were taken from data collectors and both descriptive and inferential statically techniques were used to analysis the data using the latest version of SPSS.

4.Data presentation analysis and interpretation

4.1. Demographic Profile of Respondents

Table 4.1. shows of the total of 362 respondents, 273 (75.4%) of them are male whereas the rest 89(24.6%) were females where as from 276 city residents respondents ,75.4% of them are males and the rest 24.6% of them are females. Also the table shows from rural respondents majority (187) of them were categorized with the age group of 25-34 where as 106 of them were categorized with age group of 34-44 and of all 276 respondents participated in the survey from the city 58.7% of them are categorized with age group of 35-44 and only 44.45% of them are uneducated from 362 and all are educated for second respondent group .i.e. city residents in the nine kebeles.

Table 4.1. Demographic Profile of Respondents

		Frequency	Percent	Frequency	Percent
Gender	Female	89	24.6	119	43.1
	Male	273	75.4	157	56.9
	Total	362	100.0	276	100.0
	25-34	187	51.7	45	16.3
	35-44	106	29.3	162	58.7
	45-54	50	13.8	69	25.0
	>=55	19	5.2	-	-
	Total	362	100.0	276	100.0
Education	No formal education	52	14.4	-	-
	Adult education	59	16.3	-	-
	Primary education complete	80	22.1	-	-
	Secondary School complete	146	40.3	34	12.3
	Certificate	19	5.2	-	-
	College student	00	0.0	106	38.4
	Diploma	6	1.7	-	-
	Degree	-	-	100	36.2
	Masters and above	00	-	36	13.0
	Total	362	100.0	276	100.0
Farming	Mixed	357	98.6	-	-
	Pastoralist	5	1.4	-	-
	Total	362	100.0	-	-

Source survey data 2016

4.1. Statistics Indicating level of knowledge and interest to produce the plant in large

The levels of awareness on the benefit of the plant for various purposes and interest plant for commercial purpose and medical purpose and knowledge on the marketability of the plant were measured by questions/statements given under part II of the questionnaire. The statements were posed in such a way that respondents could rate the level of their knowledge, and interest to plant Moringa, and Liker scale was used to measure the level of awareness and interest to produce the plant.

4.2. Statistics Indicating level of knowledge and interest to produce the plant in large

Attributes	N	Mean	Std. D.
Knowledge on the benefit of moringa plant for Fertilizer	362	4.5359	.78425
Level of awareness on the benefit of moringa plant for Disease Prevention	362	4.5276	.64508
Knowledge on the benefit of moringa plant for Water Purification	362	4.5249	.73736
Knowledge on the benefit of moringa plant for Insecticide and fungicide	362	4.5166	.52737
Knowledge on the benefit of moringa plant for Honey Production	362	4.5028	.53285
Knowledge on the marketability potential of the plant	362	1.3729	.75293
Knowledge on the benefit of moringa plant for Traditional medicine	362	4.0773	.97024
Knowledge on the benefit of moringa plant for Erosion Control and wind Barrier	362	4.3343	.69537
Knowledge on the benefit of moringa plant for Alley Cropping	362	3.3122	.71340
Interest to plant for commercial purpose	362	1.6215	.63410
Knowledge uses as animal food and increase productivity	362	1.5691	.96586
Level of awareness on the benefit of moringa plant for food and nutrition	362	1.4613	.79465
Interest to plant for traditional medicine	362	1.4033	.52924
Valid N (list wise)	362		

Source survey data 2016

The mean scores show that there is very high level of awareness on moringa benefit for fertilizer and diseases prevention with mean of 4.5359 and 4.53 score respectively whereas on the benefit of the plant for water purification and insect and pest side has the mean of 4.52 and 4.53 also respondents have awareness on the benefit of the plat for Haney production with the mean of 4.5 though they don't believe on the marketability potential of the plat with mean of 1.3729 and there is low mean on the interest of producing for commercial purpose.

4.3. Statistics Indicating the Levels of awareness, perception and interest to use moringa in the city

Liker scale was used to measure the level of awareness, perception and interest to use, either the process or raw moringa for different purpose. The higher the score, the more the level of awareness, perception and interest are the variables as evaluation criteria. Five point scales were used to measure the level of awareness, perception and interest of factors in such a way that mean score could be calculated to determine the level of factors in the use of the plant for different purpose. With five point scales, the intervals for breaking the range in measuring each variable are calculated as follows:

$$\frac{\text{Max.-Min.}}{5} = 5\text{-}1/5 = 0.8 = \text{high awareness, perception or interest Level}$$

It means that the scores falling between the following ranges can be considered as: Score 1.00 – 1.80 Means low Awareness, perception or interest Level Importance, Score 1.81 – 2.60 Means low Awareness, perception or interest Level ,Score 2.61 – 3.40 Means medium Awareness, perception or interest Level , Score 3.41 – 4.20 High Awareness, perception or interest Level 4.21 – 5.00 very high Awareness, perception or interest Level best and Seven statements were developed for each variable i.e. awareness, perception and interests and two for willingness to use the plant and pay for moringa variables were used to determine the market demand.

Table 4.3. Statistics Indicating the Levels of awareness, perception and interest to use moringa

Attributes	Mean	Std. D.	Degree
Level of Awareness			
on the benefit of moringa plant for food and nutrition	4.2065	.92879	Very high
on the benefit of moringa plant for Disease Prevention	2.6978	1.36496	medium
on the benefit of moringa plant for Erosion and wind Barrier	2.7029	.89369	Medium
on the benefit of moringa plant for Water Purification	2.5471	1.55667	Low
on the benefit of moringa plant for Insecticide and fungicide	3.1848	.86461	Medium
on the benefit of moringa plant as Traditional medicine	4.4529	.89927	Very high
on the benefit of moringa plant for Ornamentation & Shade	1.5942	1.02079	Very low
Level of Perception			**Degree**
on the benefit of moringa plant for food and nutrition	4.6848	.65941	Very high
on the benefit of moringa plant for Disease Prevention	4.3080	.54213	Very high
on the benefit of moringa plant for Erosion and wind Barrier	3.1449	.40989	Medium
on the benefit of moringa plant for Water Purification	3.0616	.68743	Medium
on the benefit of moringa plant for Insecticide and fungicide	4.3261	.80148	Very high
on the benefit of moringa plant for Traditional medicine	4.2645	.66522	Very high
on the benefit of moringa plant for Ornamentation & Shade	2.9022	.96174	Medium
Level Of Interest			**Degree**
to use the plant as supplementary food and nutrition	4.4167	.56916	Very high
to use the plant for Disease Prevention	4.4686	.53570	Very high
to use the plant for Erosion and wind Barrier	3.1594	.46313	Medium
to use the plant for Water Purification	2.8696	.55695	Medium
to use the plant or Insecticide and fungicide	3.0036	.33573	Medium
to use the plant as Traditional medicine	4.2826	.83548	Very high
To use the plant as Ornamentation & Shading plant.	3.2500	.76693	Medium
Willingness to buy the processed moringa plant.	4.2210	.49550	Very high
willingness to pay for moringa's perceived benefits	4.4167	.71117	Very high
Valid N (list wise) 276			

Sources:-own survey questionnaire 2016.

The mean scores show that there is very high level of awareness on moringa benefit for food and medical plant with mean of 4.20 and 4.45 score respectively whereas with the mean of 2.69 and 3.1 respondents have a medium awareness level on the use of the plant as disease prevention and wind barrier . in contrary there is high interest by respondents to use the plant for food , disease prevention , traditional medicine and insect side with the mean of 4.6 ,4.3 ,4.2 and 4.3 respectively . Finally, the interest to use the plant as food, disease prevention, and traditional medicine were very high and the willingness to buy processed moringa and willingness to pay for perceived benefit of moringa is very high showing there is high demand for the product.

4.4. Reliability Testing

To assess reliability and internal consistency of the variables, Cronbach's 'alpha' was calculated. A benchmark alpha of .70 was set as an acceptable measure of reliability (Cronbach, 1951). The value of Cranach's alpha for level of awareness on moringa benefit was .839, level of perception on moringa benefit dimension was an alpha of .858, and interest to use moringa for different purpose were having of an alpha of .892. The reliability of the variables used is summarized in the table 4.6.

Table 4.4: Variables Reliability

Variables	*Item*	*Reliability(Cronbach's alpha)*
Awareness	7	.839
Perception	7	.858
Interest	7	.892
Total	21	

Sources:-own survey questionnaire 2016.

4.4. Correlation between Level of Awareness, perception, Interest, willingness to pay and Knowledge on the Marketability, of the Plant

Tale 4 .5.Correlations

		Level of awareness on the benefit	Interest to plant for commercial purpose	Interest to plant for traditional medicine	Knowledge on the marketability potential
Awareness On The Benefit Of Moringa Plant	Pearson Correlation	1	.144**	.009	.154**
	Sig. (2-tailed)		.001	.000	.001
Interest to plant for commercial purpose	Pearson Correlation	.144**	1	.233**	.336**
	Sig. (2-tailed)	.005		.000	.000
Interest to plant for traditional medicine	Pearson Correlation	.009	.233**	1	-.031
	Sig. (2-tailed)	.000	.000		.000
Knowledge on the marketability potential of the plant	Pearson Correlation	.154**	.336**	.031	1
	Sig. (2-tailed)	.003	.000	.000	
		awareness on the benefit of moringa	perceptions on the benefit of moringa	Interest to use the plant	Willingness to pay for perceived benefit
awareness on the benefit of moringa	Pearson Correlation	1	.680**	.536**	.859**
	Sig. (2-tailed)		.000	.000	.000
perceptions toward the benefit of moringa	Pearson Correlation	.680**	1	.931**	.720*
	Sig. (2-tailed)	.000		.000	.000
Interest to use the plant	Pearson Correlation	.536**	.931	1	.964**
	Sig. (2-tailed)	.000	.000		.000
Willingness to pay for perceived benefit	Pearson Correlation	.859**	.720*	.964**	1
	Sig. (2-tailed)	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed). Where N = 362 and 276 Respectively

Source survey data 2016

As the table shows, there is a weak correlation between the interest to plant for commercial purpose level of awareness with correlation value of 1.44 whereas, interest to plant for medical purpose with level of knowledge still have weak relationship (r=.009) however knowledge on the marketability of the plant have relationship with interest to plant for commercial purpose.

4.5. Analysis of variances for Knowledge vs. interest to plant moringa

Table 4.5. ANOVA

		$\sum^2$	df	Mean Square	F	Sig.
Knowledge on the benefit of the plant	Between Groups	2.763	3	.921	.978	.000
	Within Groups	337.072	358	.942		
	Total	339.834	361			
Knowledge on the marketability potential of the plant	Between Groups	4.769	3	1.590	2.847	.000
	Within Groups	199.886	358	.558		
	Total	204.655	361			
Interest to plant for traditional medicine	Between Groups	1.889	3	.630	2.272	.001
	Within Groups	99.227	358	.277		
	Total	101.116	361			
Interest to plant for commercial purpose	Between Groups	1.675	3	.558	1.393	.005
	Within Groups	143.477	358	.401		
	Total	145.152	361			

Source survey data 2016

Of all the information presented in the ANOVA table, the major interest of the researcher will most likely be focused on the value located in the "Sig." column, because this is the exact significance level of the ANOVA and as it shown there is significant between groups in all cases where all are less than .005. In addition to the above there are significant difference between age, and education on knowledge.

Figure 4.1. Major function of the plant as consumers view
Sources: Survey questionnaire 2016.

As the above table shows , among the respondents majority of them are using the plant as erosion controlling and wind barrier(36.2%) , reducing ,body Weight(35.1%) , for traditional medicine(26.4) , diseases prevision(2.2%) respectively . showing there is utilization but gaps are still exist on using the pant for different purpose.

Table 4 .6.Respondents classification based on Age * purpose to use the product Cross tabulation

		For what purpose do you use the product?				Total
		For Disease Prevention	For Traditional medicine	For reducing body weight	for other purpose	
Respondents classification based on Age	25-34	2	15	11	17	45
	35-44	3	40	56	63	162
	45-54	1	18	30	20	69
Total		6	73	97	100	276

Sources:-own survey questionnaire 2016.

The cross tabulation shows, majority of the responded form age group of 35-44, 56 of them were used for reducing weight , whereas , 66 respondents form this age category were used the plant for differ purpose

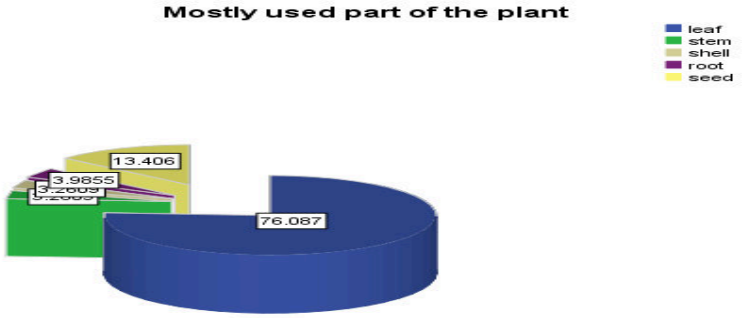

Figure 4.2.Mostly Used Part of the Plants
Sources:-On Survey questionnaire 2016.

210 respondents who said they use leaf of the plant, 73.6% of there were using in the form of powder whereas, 26.45 of using the raw leaf for different purposes

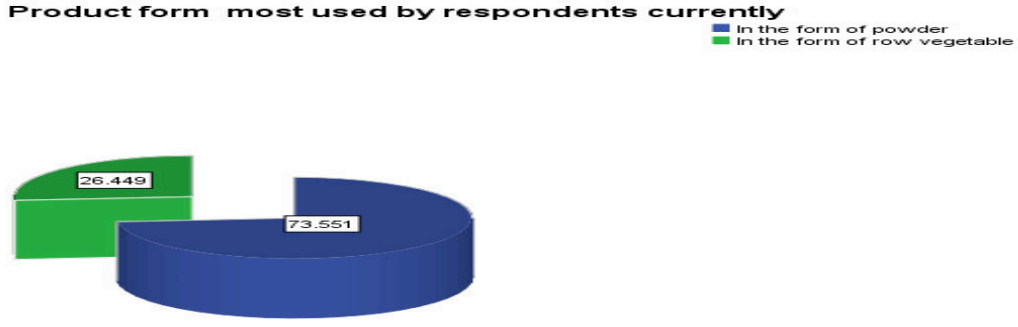

Figure 4.3.product form mostly used by the consumers
Sources:- survey questionnaire 2016.

With regarding to the sources where they get the processed powdered moringa, of 155 respondents who

use moringa powder, 77 of them were accessed the product form other places, where as 63 of them were get the product from dire Dawa small and medium enterprises that engaged in processing and packing of the product and the rest 15 respondents were accessed the powder form shops located in different part of the city .see fig4.11.and table 4.21.

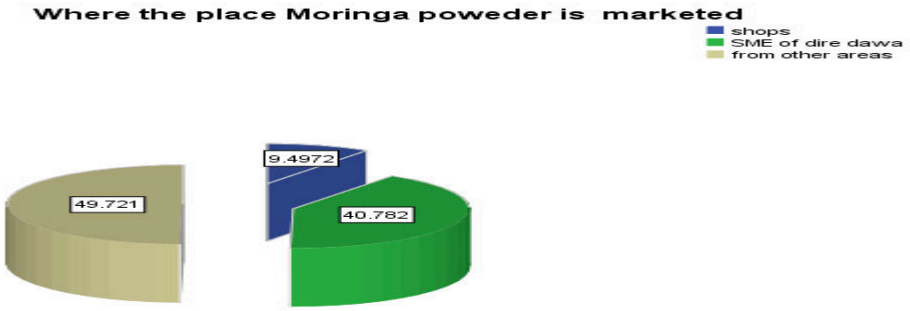

Figure 4.4.market accessibly to the plant
Sources:-won Survey questionnaire 2016.

As the table above shows, majority of the respondents (311) (85%) of them believe that they are not engage in production of the plant for market because they believe that there is no market access to the product and no demand for the product where 44 of the respondent s perceive that production cost and market price is significantly varies and 1.9% of them were not know how to collect the product.

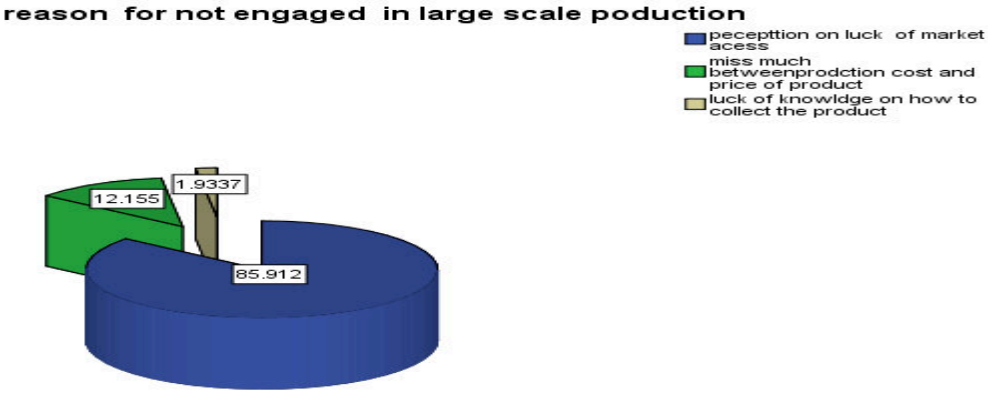

Figure 4.5.Reason for not engaged in large scale production
Source survey data 2016

Table 4.7. Reason most responds use the plant

Attributes	Frequency		Percent		Ranks	
	User	Producer	User	Producer	User	Producer
Treatment of headaches and fever	94	352	34.05	97.2	6	1
For treatment of, Diarrhea and intestinal worms	145	295	52.53	81.5	5	7
For treatment of wound healing	24	316	8.69	87.3	8	6
for treatment of skin infection and prevision	12	286	4.34	79.0	9	9
For treatment of Respiratory disorders	241	321	87.32	88.7	3	4
For treatment of malaria	32	329		90.9	7	3
For treatment of goiter and swelling on the head	-	338	-	93.4	-	2
For solving problem relate with Pregnancy	-	268	-	74.0	-	10
For treatment of Pain in joints ,over all Sores and Sprain	-	294	-	81.2	-	8
Blood pressure	272	-	98.55	-	2	-
f For treatment of diabetes	276	-	100.0	-	1	-

As table 4.7 shows , majority of the city dwellers are using for diabetes treatment followed by blood pressure ,chest congestion and Diarrhea and intestinal worms where as the potential producers uses the plant mostly treatment of headaches and fever ,goiter and swelling for treatment of malarias ,treatment of respiratory problems respectively.

4.3. Analysis of data collected from Interview

Under this section, the analysis is conducted on the data collected through interview based on ten semi-structured questions with the bureau of agriculture and forestry and themes were identified to categorize these data in light of the aims and objectives of the research. This section, therefore, explores and describes the degree of support and working to promote and repent the plat socio-economic benefit of the plant for the community as whole there practice to support SME and investors who are willing to invest on the area.

In over all, pertaining to the concept of moringa multi benefit .i.e. as food (both for human and animals) medical values, environmental protection and other benefits; agricultural bureau of the administration , environment and climate change resilience office , and the administration small and medium enterprise claimed there organization knows the overall benefit of the plant though they are not working in promotion and expanding the plant benefit to community increasing its value as economic and social cases. Also the agricultural bureau manager the plant is growing in all thirty eight rural kebeles and nine urban kebeles of the administration because the agro ecological zone is suitable for production of this plant though there is no such special emphasis given to the specious but as any plant the bureau were distributing the plant during plantation season but no such strong special cases were given to the plants because The first reason is still now there is no such strong strategic guide line and emphasis given to the plant depending to the benefit second there is luck of human power and disintegration and luck of organized work on its area are the major problem also Still now there is no such ruling guideline developed by both at national or administration level and the consideration regarding to the utilization of the plant benefit is not such attractive.

Still now no government plan is develop to exploit the plant but recently self initiated investors were asking the bureau to help them to provide plant species to engage in commercial production similarly with the initiation of non government organization there was training providing for SME on how to cook and process moringa focusing on value adding activities but not continuing as planed because of luck of strong follow up ware is done by the bureau but, in some rural area they are using it as food for their animals and in the city resident are consuming in the form of moringa tea but not as such.

In all kebeles the plant is available and the community are using the plant for different purpose and also they have stated the different benefit of the plant form food to medial form disease prevision to environmental protection but the effort to plant to promote even in degraded part of the area where there is shortage of water is very low is low despite the plant nature that have high drought resistance and suitable for such environment. but there is a plan under the community based forestry development project that aims benefiting the community through environmental protection and ensuring economic benefits since the demand is increasing in main city of the country and have international demand **by** utilizing the regional advantage of growing such plant for different purpose were the area largely expose to drought and water shortage.

Currently, In terms of converting the plant in to economic benefit only two small and medium were engage in moringa production and packaging.

5.0. Discussion and recommendation

5.1. Discussion

Based on the findings majorities (56.9 %) of the survey's participants were males and 58.7% (162) were aged in between 35-44, 16.3% All of them were educated. Majority of the respondents (97%) consider as a potential market for the plant and have knowledge on the benefit of the plants however when we triangulate the data from the benefit of the plant there knowledge toward the plant is limited to 10 elements though more than 27 moringa benefits are provided for choices.

On the benefit of the plant vs. willingness to pay the mean scores show that there is very high level of awareness on moringa benefit for food and medical plant with mean of 4.20 and 4.45 score respectively whereas with the mean of 2.69 and 3.1 respondents have a medium awareness level on the use of the plant as disease prevention and wind barrier . in contrary there is high interest by respondents to use the plant for food , disease prevention , traditional medicine and insect side with the mean of 4.6 ,4.3 ,4.2 and 4.3 respectively . Finally, the interest to use the plant as food, disease prevention, and traditional medicine were very high and the willingness to buy processed moringa and willingness to pay for perceived benefit of moringa is very high showing there is high demand for the product.

Also the levels of awareness on the overall benefit have positive correlation with perception on its effectiveness and interest to use the plant for different reasons with (r=.680**p= .000),(r=.931** p=.000) and (r=.536** p=.000) showing there is appositive and strong relationship between awareness, perception and interest to use the plant.

in terms of using of the plant parts in the city, (36.2%) use the plant for shading in there yard,, reducing ,body Weight(35.1%) , for traditional medicine(26.4) , diseases prevention (2.2%) respectively . showing there is utilization but gaps are still exist on using the pant for different purpose. and 76.1% of the respondents were mostly use leaf of the plant were as 13.4% of the respondents were using the seeds of the pant.

meanwhile ,Of 76.1 % of respondents who use the leaf , 73.6% of there were using in the form of powder whereas, 26.45 of using the raw leaf for different purposes. in terms of product accessibility in the market fir processed moringa, of 155 respondents who use moringa powder, 77 of them were accessed the product form other places, where as 63 of them were get the product from dire Dawa small and medium enterprises 15 respondents were made by themselves.

To know the potential producers awareness, perception and interest to produce for the market we have conducted a onetime survey on seven selected rural kebeles of Dire Dawa administration and of total of 273 (75.4%) of them are male whereas the rest 89(24.6%) were females respondents or households lead by females and all have knowledge on the benefit of the plant finding shows, there is very high level of awareness on moringa benefit for fertilizer and diseases prevention with mean of 4.5359 and 4.5276score respectively whereas on the benefit of the plant for water purification and insect and pest side has the mean of 4.5249and 4.5166 also respondents have awareness on the benefit of the plat for Haney production with the mean of 4.5028 though they don't believe on the marketability potential of the plat with mean of 1.3729 and there is low mean on the interest of producing for commercial purpose. (85%) of respondents were have interest to engage in production of the plant for market because they believe that there is no market access to the product and no demand for the product. However when compare their level of awareness on the plant benefit vs. Consumption between city and rural respondents, rural respondents have used the plant for different purpose than the city respondents.

Furthermore as Field observations in the city and rural vicinity and interview with different bureaus revealed that Moringa was mostly grown scattered around homesteads in association with other trees in family and there is no organized farming which committed for market and all are growing without irrigation and in home garden where trees were grown on the edges.

Besides due to small land owning and large family size the Competition for land with other food crops and perception on it will take large space is the second major constraints as the observation and interview shows , In Dire Dawa and its rural kebeles there are no formal Growers even by taking small portions of land for Moringa production. They intensively involve with first cultivation, chat and coffee mostly and they use moringa in there vicinity as shade for sun and they believe that it will take large space than anther plants and will destroy plants that is growing under it though is this misconception and have techniques of growing the plant for commercial purpose without taking large spaces.

Also Lack of advices and support from local government and forestry bureau is the other constraints, according to the interview with the bureau they contributed very little as sources of planting material due to reduced mobility of its staff in offering extension services and operational constraints. This reduced their ability to carry out their institutional mandate. Little was sourced from private nurseries due to financial constraints. According to respondents, seedlings from private nurseries were expensive and reach to 50 birr for single seedlings.

Moreover Low yield levels are the major constraints that hinder to inter in production of the plant. Majority of the potential producers perceive that they had no knowledge of their yields (fresh leaf, bark and seed) from their trees. This was a result of sporadic usage of the plant parts by the growers. Moringa production is no or rarely done by farmers and fresh leaf yield levels were too low as compared to other regions though there are no specific average yields in Moringa production in Dire Dawa as whole. And although the production of powder was insufficient in quantity and quality and also there was no control in the preparation and storage which hider the marketing and production potential and still now production for commercial purpose is done by few Small city enterprises engage in mixed farming with self initiation and no support is provided by government bodies.

In addition to the above production constraints, Lack of markets are considered as the major factor that hinder their engagement for commercial purpose .Here there two things, one is reality the other is perception on lack of market, as per the analysis and interviewing with consumer there is high demand for product specially in the form of powder which is also justified in many literature conducted in different country and so true in Ethiopia where there are more than 15 exporter and 5 importers are working in Ethiopia. However on the second analysis there is high negative perception on market availability of the product and there is no assured markets for Moringa tree products and information regarding available markets is scarce.

5.2. Recommendation

To fill those gaps stated in the discussion section based on the analysis Small and medium enterprises, agricultural bureau of Dire Dawa, environmental protection and climate change resiliencies need to work to gather to use the plant for socio economic development and to support the green based economy.

As the topography of Dire Dawa shows the administration is sandy, desert with degraded mountainous land where resources are intensively used by the residents and almost stop on using it; the plant there for, If SME organizes young and unemployed population part of the city as well as rural dwellers on cultivating of the plant, it will have potential of creating job opportunities by selling the leaf through adding value, engage in haney

production and animal husbandry.

Also, irrespective of market positive perception and interest and willingness to pay for processes moringa, the availability of the plant with value addition and at local producers level is very weak and restricting to powder format showing there is huge potential for production, value addition and marketing the plant not only within the city neighboring regions too where the price of a kilo moringa reach up to 400 Ethiopian birr for imported and 180 local one.

Further if it grows with other marketable plants and use irrigation water they would also benefit from the shade and saved on water requirements due to reduced its nature of evapo-transpiration (Prat *et al*., 2002).

in addition, Soil fertility would be replenished through addition of organic manure from leaf litter reducing the need to apply inorganic fertilizers. The cultivation of Moringa in Ethiopia particularly Dire Dawa needs to evolve to such an extent of focusing on commercial production of Moringa products like in other regions .i.e. South west Ethiopia, konso , Arba-minch etc… and non government organization that support the food shortage of the area need to be engaged in promoting the plant benefit and need to involved in on providing seedlings handouts to the farmer and even expected to show marketability potential value addition opportunities and develops pure, non adulterated and quality standard moringa with efficient packaging and storage of Moringa products so that they meet both local and global markets if opened up and can benefit and become sources of employment. Also to change the perception and improve marketing potential and to create demand for the product, they need to promote intensively both government organization and nongovernmental organization.

Finally, within Dire Dawa administration there are site that organized by government for sustainable green project and frost enterprise on seven different places i.e. Dewalle,Awale,Adada ,Beshanbeli, Legeoda, Kellumjo and Bulefta. And if government uses this places and use as showing cases that there will be high potential for promoting the plant both for commercial and usage purposes.

Also despite the existence of knowledge, perception and interest to use the product form the market side; there is a very weak willingness to engage for commercial purpose by the potential producers showing that government and concerned bodies need to work on promoting opportunities in Moringa production because there are many opportunities that potential smallholder growers can grab considering the difficult agro ecological conditions that prevail to secure a better livelihood from Moringa farming in eastern part of Ethiopia specifically Dire Dawa where it is desert and drought porn area. Also without any farming land moringa can be grow marginal land as is resilient to harsh growing environments, including drought and poor soil quality. And if it largely done it has socio-economic advantage and Competition for land with other food crops will be reduced and land will be utilized effectively for both livestock and human food requirements enhancing food security. This will promote climate change resilient agricultural systems and will be a solution to environmental problems. Further it will increase livelihood security and diversification since the tree is very fast growing, with normal growth ranging from 3-5 meters per year if left uncut. Growers will quickly realize benefits from the tree in a very short period for both human and livestock. With Moringa tree parts, since it retaining high percentages of vital nutrients throughout the year it is an advantage for livestock production, which experiences great seasonal variations in quality and quantity of forage. Moringa thus can be used as source of protein to supplement poor quality forage in the dry season. This will help sustain and enhance livestock production systems and boost livelihoods.

Finally, since it is a tree by itself and have five endemic spacious it can be used to cover deforested areas within the region.

Acknowledgment

We would like to thanks Dire Dawa University for sponsoring as to conduct this research.

Reference

Abay Akalu, (2007).Vegetable market chain analysis in Amhara National Regional State: the case of Fogera woreda, South Gondar zone. M.Sc thesis presented to the school of graduate studies, Haramaya University. pp70

Abuye, C., Urga, K., Knapp, H., Selmar, K., Omwega, A.M., Imungi, J.K. & Winterhalter, P., (2003). A compositional study of Moringa stenopetala leaves. East African Medical Journal 80(5): 247–250.

Acta Univ. Ups. Symb. Bot. Ups. 28(3):171-185. Uppsala. ISBN 91- 554-2348-5.

Acta Univ. Ups. Symb. Bot. Ups. 28(3):171-185. Uppsala. ISBN 91- 554-2348-5.

Babu, S.C. (2000). Rural nutrition interventions with indigenous plant foods: a case studyof vitamin A deficiency in Malawi. BiotechnolAgronSoc .Environ. 4(3):169- 179.

Bezabih Emana and Hadera Gebremedihin, (2007). Constraints and opportunities of horticulture production and marketing in Eastern Ethiopia. Dry Lands Coordination Group Report No 46. Grensen 9b. Norway.

Bosch, C.H., (2004). Moringa stenopetala (Baker f.) Cufod. In: Grubben, G.J.H. & Denton,O.A. (Editors).

PROTA 2: Vegetables/Légumes. [CD-Rom]. PROTA, Wageningen, Netherlands.
Crosby, G.W. (2007): Soilless Culture of Moringa (Moringa oleifera Lam.) for the Production of Fresh Biomass. PhD Thesis.
Edwards,S.,M.Tadesse,S.Demissew and I.Hedberg,(200).flora of Ethiopia and Eretria , Volume 2 part 1:Magnoliaceae to Flacourtiaceae.Addis Ababa Unveristy,ethiopia ,Uppsal Sweden pp660.
Evans J (1991). Safe drinking water for developing world. Our Planet (UNEP) 3(1):12-13
Evans J (1991). Safe drinking water for developing world. Our Planet (UNEP) 3(1):12-13
Ezeamuzie, I.C., Ambadederomo, A.W., Shode, F.O., Ekwebelem, S.C., 1996. ` Anti inXammatory eVects of *Moringa oleifera* root extract. International Journal of Pharmacognosy 34, 207–212
Fashey, F. W. (2005): *Moringa oleifera*: A Review of the Medical Evidence for Its Nutritional, Therapeutic and Prophylactic Properties. Part I. trees for Life Journal.
Foidl, N., Harinder, P. S. Et K. Becker, (2001). Potentiel du *Moringa oleifera* pour lesbesoins-agricoles et industriels *in* L'arbre de la vie, Les multiples usages duMoringa. CTA et CWS, Dakar, pp.45 à 78.
Folkard GK, Sutherland JP (1996). Moringa oleifera: a tree and a litany of potential. Agrofor. Today. pp. 5-8.
Fuglie, L J., (2001). Combattre la malnutrition avec le Moringa *in* L'arbre de la vie,Les multiples usages du Moringa. CTA et CWS, Dakar, pp.119 à 139.
Fuglie, L.J. (2000). New Uses of Moringa Studied in Nicaragua. ECHO Development Notes #68
Fuglie, L.J.(1999). The Miracle Tree: Moringa oleifera: Natural Nutrition for the Tropics. Church World Service, Dakar. 68 pp.; revised in 2001 and published as The Miracle Tree: The Multiple Attributes of Moringa, 172
Jahn SAA (1988a). Flocculation experiments with waste waters in Guatemala and field notes from Costa Rica. Unpublished report for GTZ.
Jahn SAA (1988b). Using Moringa seeds as a coagulant in developing countries. J. Am. Water Works Assoc. 80:43-50.
Jahn SAA (1988b). Using Moringa seeds as a coagulant in developing countries. J. Am. Water Works Assoc. 80:43-50.
Jahn SAA (1988c). Chemotaxonomy of flocculating plant materials and their application for rural water purification in developing countries.
Jahn, S.A.A.,(1984). Effectiveness of traditional flocculent as primary coagulants and coagulant aids for the treatment of tropical raw water with more than a thousand -fold fluctuation in turbidity. water supply 2: 8-10
Jema Haji, (2008). Economic efficiency and marketing performance of vegetable production in the Eastern and Central Parts of Ethiopia. PhD Dissertation, Swedish University of Agricultural Sciences, Uppsala, pp64.
Kadashi Y.D. (2008). The healing power of Moringa tree for Nigerian homes. P. 1.De peak publishers, Zola. P. 1
Ludington A. and Diehl, H. (2003): Health Power, Health by Choice not Chance, Lifestyle Medicine Institute LLC Loma Linda, CA 92354, Pp 52 – 55.
Mahatab, S.N., Ali, A and Asaduzzaman, A.H.M. (1987). Nutritional potential of sajna leaves inmgoats. Live stock Advisor, 12 (12): 9-12
Makkar HPS, Becker K. Nutritional value and anti-nutritional components of whole and ethanol extracted Moringa oleifera leaves. Anim Feed Sci Technol. 1996; 63: 211-228.
Mark,E.O.,(1998)Reaseach on applied use of moringa stenoptalia .FAO techincal bullitin no.4. http;//www.berfingen.info/akababi/simon.htm.
Mayer FA, Stelz E (1993). Moringa stenopetala provides food and lowcost water purification. Agrofor. Syst. 5:16-18
Mishra,S.P., Singh,P and Singh, S.(2011).Nutritional and medicinal value of Moringa oleifera leaves: Potential and Prospects. Forestry Bulletin, 11(1):46-58
Morton JF (1991). The horseradish tree, *Moringa pterygosperma* (Moringaceae)- A boon to arid l ands? Econ. Bot. 45:318-333.
Moti Jaleta, (2007). Econometric analysis of horticultural production and marketing in central and eastern Ethiopia. PhD Dissertation, Wageningen University. The Netherlands.p 101.
Nadeau, E and Zakaria, M. (2012). *The Sahel's Tree of Life: The Story of CLUSA's Moringa VC Project in Niger*. Working paper prepared for the National Cooperative Business Association (NCBA) and the Cooperative League of the USA (CLUSA). Assessed on http://www.huffingtonpost.com/annette frost/moringa-the-tree-of-life_b_1645858.html on 24 Aug 2012 04:34:37 GMT
Okeke, A. I. (2010): Agroforestry System and Environmental Management, Lecture Note, College of Natural Resources and Environmental Management, Michael Okpara University of Agriculture, Abia State.
Olayemi AB, Alabi RO (1994). Studies on traditional water purification using Moringa oleifera seeds. Afr. Study Monogr. 15(3):135-141.

Olson, M. E. and Carlquest, S. (2001): Botanical Journal of the Linneen Society 135 (4): 315 – 348.

Omaruyi, F. O, and Adounson, I. (1994): Effect of Dika nut (*Irvingia gabonensis*) and Celluloseon Plasma Lipid in Streptozotocin Induced Diabetic Ratem Nur. Res. 14: 537 – 544.

Orwa etal,(2009)AgroforestryDatabase 4.0. Available from: http://www.worldagroforestry.org/treedb2/ AFTPDFS/Moringa_oleifera.pdf

Palada, M. C., Chang, L. C. (2003) Suggested Cultural Practices for Moringa. International Cooperators Guide. . AVRDC pub # 03-545.

Panga JT (2002). Effect of processing on nutritional quality of Moringa oleifera leaves and pods. MSc. Dissertation, SUA, Tanzania. pp. 81.

Patel,J.P., Bharat, G and Patel, K. (2010). Evaluation of invitroSchizonticidal Properties ofAcetone Extract of some Indian Medicinal Plants. Advances in Biological Research 4 (5): 253-258, 2010. ISSN 1992-0067. IDOSI Publications

Ramachandran C, Peter KV, Gopalakrishna PK. Drumstick (1980) (Moringa oleifera): A Multipurpose Indian Vegetable. Economic Botany ; 34(3): 276-283.

S. Lalas,J.Tsaknis, k. Sflomos (2003). Characterisation of Moringa stenopetala seed oil variety "Marigat" from island Kokwa. Eur. J. Lipid Sci. Technol.10 5; 23–31.

Singh,S., Mishra, S.P., Singh, P.,Prasad, R.S and Das, R.(2012).Potential and Prospects of Moringa oleifera Lam.(Sahjan).Institute of Forest Productivity. IFP/2012/01

Sutherland, J.P., Folkard G.K. & Poirier Y.L. (2001) Moringa Oleifera. The Constraints to Commercialisation. In: Development potential for Moringa products October 29th - November 2nd 2001. Dar Es Salam, Tanzania. Available from: http://www.moringanews.org/biblio_en.html

Tony Tripodi, DSW, 2008, Determining Sample Size Balancing Power, Precision, and Practicality, oxford university press

Tsaknis, J., Lalas, S., Gergis, V., Dourtoglou, V., Spilotis, V.,(1999). Characterisation of *Moringa oleifera* variety Mbololo seed oil of Kenya. Journal of Agricultural and Food Chemistry 47, 4495–4499.

Villarreal, M. and Anyonge, C. H. (2006): The Challenge of HIV/AIDS: Where does agroforestrry Fit in? food and Agriculture organization of the United Nations, Brent Swallow and Freddie, World Agroforestry Centre . Pg. 181 – 191.

Williams, F.E., Animashaun, J.O., Toye, A.A and Ibrahim, H. (2012): *Use and Determinants of Adoption of Moringa Products for Nutraceutical Benefits in Ilorin-South Local Government Area of Kwara State, Nigeria.* Paper presented at the first University of Ilorin Moringa Leading Edge (MLE) conference held on September 11, 2012 at the University of Ilorin, Ilorin, Nigeria.